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FORESTRY ABSTRACTS

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VOLUME 6 1944 NUMBER 1

THE FLORA OF THE MEDITERRANEAN REGION

Introduction. Professor M. Rikli's new book* on the plant cover of the Mediterranean region constitutes a successor to his previous work on 'The life conditions and vegetation of the Mediterranean countries and Atlantic islands' [Lebensbedingungen und Vegetationsverhältnisse der Mittelmeerländer und atlantischen Inseln], Jena, 1913. Not only does the new book benefit from the continuous research and exploration conducted by the author during the intervening years, but the scope of the enquiry and the area studied have been considerably enlarged, so that the work presents a detailed, documented account of the plant geography of the region that is of unusual interest, especially in view of the importance of the Mediterranean basin as the centre of origin of many cultivated plants.

Publication is in 120-page serial parts, the first four of which have now been issued, comprising Volume 1. The work is copiously illustrated by photographs, colour prints and a very large number of maps showing the geographic distribution of numerous different species. The maps have been prepared on the basis of the classic floristic works, partly in consultation with specialists on certain parts of the region, and it is noted that their primary object is to serve as a stimulus for the collection of further data so that in a later edition they may be supplemented or corrected as is found necessary. Communications on this subject are invited by the author.

The eight chapters contained in the first volume define the region and its limits, with some reference to transitional zones, and deal with its climatic conditions, with the life forms of the Mediterranean flora and their phenology, finally presenting a part of a classified account of the flora itself. Chapter 7 deals with that of the natural land of the cultivable belt, describing five groups of formations found in land not under culture. The cultivated land is to be treated in the tenth chapter. Chapter 8 classifies the Mediterranean flora in accordance with altitude, wherein three more or less clearly defined altitude lines or vegetation belts are distinguished, namely (1) the evergreen, Mediterranean culture belt (also described as the Olive girdle or, from its most important formation, the maquis girdle); (2) the Mediterranean mountain belt, embracing the region from the upper limit of the evergreen belt to the upper forest- and tree-line; and (3) the orophytic belt.

Of undoubted interest to silviculturists is the second section of this chapter, dealing with the mountain forest, and earlier chapters dealing with the Olive tree, with the *Quercus* and other woodlands of the cultivated belt, and with the maquis and the garigue.

The Olive tree. An entire chapter is devoted to the Olive tree. Very large areas of the Mediterranean basin are entirely devoid of woods, and where these are found, with the exception of a few mountain forests, they hardly exhibit the luxuriance and density of those of more northerly latitudes. Here, then, the widely extended Olive cultures serve to a certain extent to replace woodlands.

Not only is the Olive tree the most valuable tree of the region economically, but it is also the principal indicator of typical Mediterranean conditions, for where it ceases to appear there is the boundary of the true Mediterranean flora. Nevertheless it is far from being indigenous: its introduction as a cultivated plant is closely bound up with the history of the regional civilization. The map illustrating the distribution of *Olea europaca* in the region shows it to be firmly entrenched practically everywhere except in the inland parts of the Balkan peninsula, in Egypt and in certain parts of Asia Minor and North Africa. It is present not only in its cultivated form, but is found growing wild in all parts of the Mediterranean basin, frequently as a component of the evergreen bush-woods. Old trees sometimes attain enormous size. Olive groves are often grazed or intercropped with cereals or some other plant, but the practice is found to be detrimental to the quantity and quality of the Olive crop.

Woods of the cultivable belt. In describing the woodlands of the cultivable belt their extremely limited range is noted, the paucity of Mediterranean woodlands being attributed not only to the unsuitability of the climate in the lowlands, hills and even in many of the mountain regions, but also to long years of neglect, spoliation, the grazing of flocks and herds by shepherds and nomads, and in some cases destruction in wars and feuds. In this belt three categories of woodland are distinguished, namely, the evergreen, dominated respectively by *Quercus suber* and other cork-supplying Oaks, *Q. ilex, Q. lusitanica, Q. calliprinos, Q. aegilops, Laurus nobilis* and *Argania spinosa*; the summer deciduous, such as the shore and alluvial woods, which are of markedly boreal character, and those dominated by *Quercus pubescens, Q. cerris* and *Fraxinus ornus* respectively; and the coniferous woods characterized by *Pinus pinea, P. halepensis, P. pinaster* and *Callitris articulata.* The cork Oaks are confined to the western Mediterranean and are most plentiful in Spain, Portugal and the North African coastal region; *Quercus ilex*, however, is found in both the west and east. Of interest is the section on the shore and alluvial woods, the following being some of the species concerned: *Alnus glutinosa, Populus nigra, P. tremula, P. canescens, P. alba, Salix* spp., *Fraxinus excelsior, Tilia* spp., *Ulmus campestris, Prunus padus, Rhamnus cathartica, Frangula alnus, Eucalyptus* spp., *Platanus orientalis, Nerium oleander* (generally shrubby but sometimes a tree 4 to 6 metres high), *Myrtus communis, Vitex agnus-castus, Cercis siliquastrum, Tamarix* spp., *Phoenix dactylifera* (extreme south of the region), *Populus euphratica* and *Pistacia* spp.

Montane forest. Above the cultivable belt, practically the whole of the mountain belt consisted originally of forest, but the spoliation of centuries has led to a far-advanced deforestation in many parts, where the place of the

*RIKLI, M. Das Pflanzenkleid der Mittelmeerländer. Verlag Hans Huber, Bern. Pts. 1–4, 1942–3. pp. 436.

woods has been taken by impoverished garigues used for grazing. In other parts, however, the high forest remains and presents a constantly changing landscape made up of different kinds of trees. The influence of the forester is altogether recent and as yet insignificant. The woods are composed either of deciduous trees, *Castanea sativa*, *Fagus sylvatica* and occasionally *Quercus ilex* playing an especially important part, or of a large number of conifers of the genera *Picea*, *Pinus*, *Abies*, *Juniperus*, *Cedrus* and *Cupressus*.

Detailed description is given of the distribution of the principal species of trees and of the woods in which they are dominant. *Castanea sativa* Mill. is actually a sub-Mediterranean species, being excluded from the dry regions on account of its relatively exacting requirements in atmospheric humidity and in water, and attains optimal development in the northern verge of the region and the montane land. Very often close relations exist between the distribution of this tree, of so much value for food, and density of population: like the Olive tree, it is through cultivation that it has become characteristic of many districts. Probably a large part of the Chestnut woods were originally mixed Oak-Chestnut or even pure Oak or (in some cases) pure Beech stands; this has become transformed through the action of man. Hereby a process of degradation set in, often leading to the conversion of the high forest into bush and even into sward. Chestnut woods of this kind are to be found on the southern slopes of the Alps, in the northern Apennines and in the Apuane Alps of Italy. Before the Ice Age *Juglans regia* was widely distributed even in western Europe; at the present time, however, the area it occupies is preponderantly Asiatic and in the European Mediterranean extends only to the Balkan peninsula, where it is widely distributed and considered indigenous, and to a small area in Greece. It is found also in the mountains on the southern shores of the Black Sea and in the Ghilan region on the southern shore of the Caspian, where its growth is spontaneous up to an elevation of 1,400 metres. *Tilia tomentosa* is found wild in Europe only in the Balkan peninsula and Hungary. This tree appears to be spreading, and in places it is observed to be gradually supplanting Oak forest. *Aesculus hippocastanum* is endemic in the Balkans, where it occupies one area embracing north and south Albania, and a part of Greece, and a second smaller one south of Prjeslav. *Fagus sylvatica* spreads from western and middle Europe southwards into the Mediterranean region, where it occupies the higher localities and often—like *Pinus cembra* and the Larch in the Alps—constitutes the upper tree-limit. In parts of the eastern Mediterranean its distribution coincides with that of the Oriental Beech, *F. orientalis*, and transitional forms are found which are taken to be hybrids. Some curious differences are recorded, considered to be genotypical, in the time at which Beeches growing side by side develop and lose their leaves. Of interest, too, is an illustration (Fig. 87) showing some "cropped Beeches" photographed in the south of Italy, in which a dense growth of short, leafy branches springs from the base of the trees in such a manner that there is formed a conical bush covering the ground for some distance. This phenomenon is apparently caused by grazing. *Betula pendula* is another tree which radiates from its boreal main area into the northern and middle part of the Mediterranean lands, becoming increasingly a tree of the mountains as it approaches the south and constituting a frequent component of the forest- and tree-limit. Its conversion into a shrub through continuous grazing is common, especially in western Bosnia and in the Herzegovina. Other northern species which have penetrated more or less far into the Mediterranean region, isolated or in groups only, are *Populus tremula*, *Carpinus betulus*, *Ulmus scabra*, *Sorbus aucuparia*, *Acer pseudoplatanus* and *Fraxinus excelsior*.

The Pines are distributed from the Mediterranean coastal lands up to the tree-limit. *Pinus sylvestris* and *P. nigra* with its many forms are widely distributed throughout the region with the exception of North Africa, where only one outpost of *P. poiretiana* is recorded in the western Rif; *P. leucodermis* and *P. peuce* are found in scattered pockets in the Balkans and the south of Italy, *P. brutia* principally about the western and southern confines of Anatolia, while *P. montana* is recorded only for the north of Spain.

Three species of Spruce are represented: *Picea abies*, most widely distributed in the Balkans but found also in the north of Spain and in the western and southern Alps of France and Italy; *P. omorica*, endemic in a fairly enclosed region of the Balkans; and *P. orientalis* in the western Caucasus and mountains of northern Asia Minor.

The genus *Abies* is represented by no less than eleven species, all without exception trees of mountain land. *A. alba* is widely distributed, the other species being confined to more or less strictly limited areas. Seven of the Mediterranean species are distinguished by long bract scales, four by short bract scales. The latter are confined to pockets in the south, as follows: *A. pinsapo* in mountains in the extreme south of Spain; *A. marocana* in the Rif Mountains of North Africa, where it is endemic; *A. numidica* in the Babor massive in eastern Algeria, where it is endemic; *A. cilicica* in three mountain localities of south-eastern Asia Minor and Syria.

The widely distributed *Abies alba* belongs more or less to the northern Mediterranean, although it follows the Apennines as far as Calabria, its absolute southern limit, and is also found in Corsica. In the Apennines it is found in clusters or small colonies, but in the Pyrenees, Corsica and the Balkan peninsula it is an important component of the mountain forest and sometimes forms pure stands. *A. nebrodensis*, endemic in the mountains of northern Sicily, is nearly extinct and only a few stunted specimens, in almost inaccessible spots, are now to be found. *A. cephalonica* is endemic in the mountains of Greece, where it forms large, dense forests, alone or with *Quercus pubescens* and *Castanea sativa*. Among these forests, however, a great deal of destruction is evident, occasioned through spoliation, burning for cultivation, and grazing. Once destroyed, rejuvenation is very slow; long periods of drought and torrential rainfall impede recovery or make it impossible. *A. borissii* (endemic in the north-east Balkans), *A. equi trojani* (endemic in a mountain locality of north-west Asia Minor), and *A. bornmülleriana* (endemic in mountains of north-west Asia Minor) occupy small and confined areas; *A. nordmanniana* is endemic in the western Caucasus.

The Junipers are represented by *Juniperus drupacea* (Asia Minor), *J. thurifera* (Spain and the Atlas Mountains), *J. excelsa* (Asia Minor, Crimea, etc.), and *J. foetidissima* (northeastern Mediterranean basin) as well as *J. oxycedrus* and *J. phoenicea*, the two most common Junipers of the Olive belt, and the common Juniper (*J. communis*), which is a mountain tree in the Mediterranean region.

Cupressus sempervirens is represented in the Mediterranean basin principally by its cultivated form, the tall, pillar Cypress, planted singly or in clusters at points of vantage, and forming a typical feature of the Mediterranean landscape. Its popularity dates from a very early period, one specimen in Lombardy being reputed to be at least 1,200 years old and the oldest tree in Italy. Not only is it of sociological interest (grown as an emblem of mourning in cemeteries and in Islamic countries planted about mosques), but it has been of utility for shelterbelts on account of its relatively great resistance to wind. The horizontal or natural form of *C. sempervirens* is a tree of the near East, and has reached the Mediterranean basin only in a few confined, hill localities.

The Cedar is found in two parts of the region only, *Cedrus atlantica* in eleven pockets of north Africa, from Ayach in the High Atlas of Morocco to the Aures Mountains northeast of Biskra, and *C. libani* in several mountains of southern Asia Minor and of Syria, with a short-needled subspecies, *brevifolia*, in Cyprus. Only a few remnants of the original, gigantic Cedar forests of Lebanon are left, recently declared to be a reserve and protected by walls from grazing animals.

Forest degradation. The destruction of the original Mediterranean forests is believed to have begun far back in the days of antiquity, and burning and grazing are still at their destructive work. Degradation is seen in various forms, of which the following are typical: (1) A narrowing of the original forest belt through clearing from below upwards and from above downwards. (2) An increasing replacement of the original forest in the lower montane region by Chestnut woods with their characteristic accompanying flora. (3) Substitution of the original forest by its one-time undergrowth, the maquis. (4) Substitution by the garigue, which plays a particularly important part in this respect, for no other plant community is able to colonize one-time forest land nearly so rapidly or thoroughly as the garigue. Not only has it monopolized large areas that were originally forest, but it has often pushed far up above the upper limit of the Mediterranean forest- and tree-line. The garigues in turn become degraded through intensive grazing, one effect of which is to eliminate many plant species, while others, including thorn bushes and poisonous plants, become dominant.

The maquis. The most important natural formation of the evergreen, cultivable belt of the Mediterranean basin is that known as maquis, its Corsican name having been generally adopted. It consists of sclerophyllous woodlands some 5–10 ft. in height, and comprises in the main evergreen, widely distributed species. In its typical form the maquis is so dense as to be penetrable only with the aid of a bush knife. In structure a high degree of uniformity is seen. The three most frequently observed dominants are *Erica arborea*, *Arbutus unedo* and *Cistus monspeliensis*. As conditions become less favourable for the maquis, that is to say as the ground becomes drier and more stony, the stand thins out increasingly; the components no longer exhibit their former luxuriance and are gradually supplanted by smaller shrubs having less exacting soil and moisture requirements, until by degrees the open formation of the garigue is reached. The garigue* is composed principally of small shrubs interspersed with a large number of geophytes and therophytes. Between maquis and garigue all manner of transitional formations exist. A detailed description is given of the botanical composition of the maquis. Its impenetrability is greatly enhanced by the presence of many plants such as *Smilax aspera* which act as lianas and are sometimes provided with thorns as well. Although the maquis is still held in some quarters to be a definitely xerophytic association, the author is not of this opinion, but notes that its water and soil requirements are relatively high, and that it is found more abundantly and in more typical form in the moister western parts of the Mediterranean basin; in the east (with the exception of the east coast of the Adriatic) it is more sparingly represented and as a rule more or less impoverished. Its altitudinal range is very considerable. In Corsica the maquis can be followed from the coast to an elevation of 500 to 600 metres, while some of its component species—under the protection of high mountain forest—are found at very much greater altitudes. In the eastern Mediterranean, however, the formation is seen principally at the cloud level, where mist and abundant rainfall encourage its growth. Its best development is observed in ravine-like indentations of coastal regions, especially when there is some protection from wind and fairly deep humus soil. The fact that maquis is seldom on lime soils is considered due to the physical characteristics of the latter, which are generally drier. Where limestone has a humus cover or sufficient moisture is otherwise available, the maquis finds its way into the limestone hills (Mt. Argentario in Italy, the Serra d'Arrabida south of Lisbon).

The influence of man on the maquis has been very considerable. In the absence of other woodlands it is consistently exploited for firewood and charcoal, and it is even more frequently destroyed to provide grazing. The author's personal observations in Corsica lead him to estimate that the greater part of the evergreen bush of that island is burnt on an average once every six to ten years. Firing is done towards the end of the dry season, and large areas of maquis are sacrificed every year, 'an expression of the age-long strife between the pastoral population, which desires to enlarge its grazing areas, and the forester, who is entrusted with the care of the woods'.

Three views exist as to the origin of the maquis, namely (1) that it comprises the undergrowth remaining from formerly extant forest; (2) that it is a definitely anthropogenic community, simply and solely due to the activities of man; and (3) that, under certain conditions and at least in certain parts of the Mediterranean basin, it has the importance of a climax formation. To the second view the author does not subscribe, and, while he considers the first to be undoubtedly true in many cases, he questions if it is always so, and gives his reasons for supporting the third hypothesis as valid in certain parts of the region.

Land reclamation. Finally, a note may be made of the recent use of trees for sand-dune stabilization in North Africa. Species of *Acacia* and *Eucalyptus* have been successfully employed for this purpose between Tripolis and Lebda (also known as Leptis Magna).

G. M. ROSEVEARE.

*The name garigue is of Provençal origin, being taken from a word which denotes *Quercus coccifera*, dominant in the garigues of the south of France.

ERRATUM

References 16, 17 and 18 of "Timber Decay" in *For. Abstr.*, 5 (217–28) should read:

CAMPBELL, W. G. (1931): *Bio-chem. J.*, **25**, 2023.

—— (1932): *Bio-chem. J.*, **26**, 1829.

—— and BOOTH, G. (1929): *Bio-chem. J.*, **23**, 566.

ABSTRACT SECTION

NOTE.—A capital letter in square brackets following the reference denotes the language in which the paper is written. A small letter denotes a summary in another or the same language, e.g. [G.e.]—German, with English summary. English [E.] is only indicated for papers published in journals usually written in foreign languages.

The term "billion" used in papers originating in North America means a thousand million.

0. GENERAL FORESTRY

01. NOMENCLATURE. BIBLIOGRAPHY. MATHEMATICAL AND STATISTICAL ANALYSIS

01.6 : 98.2 : 60.3 : 3. Literatura po lesnoy promȳshlennosti: annotirovanȳ ukazatel' sovetskoy i inostrannoy literaturȳ po lesovodstvu, lesoeksploatatsii, obrabotke i pererabotke drevesinȳ. [Literature on the timber industry: reference index on Soviet and foreign literature on forestry, timber utilization, woodworking and wood treatment.] Nauchno-metodicheskiy Kabinet GUUZa NKLesa SSSR [*Publ.*] [3 (16)], 1940. pp. 93. [4/5 (17/18)], 1941. pp. 81. [Russ.]

01.7 : 12.19 : 12.26–8. PETROV, A. P. **An investigation into the phytocolnose of deciduous woodlands.** *Sovetsk. Bot.* No. 4/5, 1942 (15–30). A.P.B.

This is a statistical study concerned with the distribution of vegetation in deciduous woodlands. The author considers the merits and shortcomings of various numbers and sizes of samples, and the relative values of the binomial, Poisson and asymmetric distributions when assessing results. The use of twenty 1-meter samples among species which are abundant ensures an accuracy of 15–20 per cent. For species of infrequent occurrence special methods of sampling need to be devised. I. Z.

05. PERIODICALS

05.3. *Annual Reports*

05.3 : 07.2. **Report on the activities of the International Union of Forest Research Organizations. January 1943–January 1944.** International Union of Forest Research Organizations. 1944. pp. 14. [G.E.F.]

05.3 (410). GREAT BRITAIN. **Nineteenth annual report of the Imperial Forestry Institute, academic year, 1942–3.** University of Oxford. 1943. pp. 12.

05.3 (410). GREAT BRITAIN. **Imperial Institute. Annual report, 1943, by the Director, Sir Harry Lindsay, K.C.I.E., C.B.E., to the Board of Governors.** Imperial Institute, London, S.W.7. 1943. pp. 62.

05.3 (410) : 21.8 : 13.15. GUNTON, H. C. **Report on the phenological observations in the British Isles from December, 1942, to November, 1943.** No. 53. *Repr. from Quart. J.R. met. Soc.* 70, 1944. pp. PR 1–32 + tbl. + dgms.

05.3 (54). INDIA. **Administration report, Cochin Forest Department 1117 M.E. (17th August, 1941 to 16th August, 1942).** Cochin Forest Department. 1942. pp. 47 + appendices.

05.3 (67.8). TANGANYIKA. **Twenty second annual report of the Forest Department, Tanganyika Territory, for the year ended 31st December, 1942.** Govt. Printer, Dar es Salaam. 1943. pp. 8.

05.3 (68.9). NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1942.** Govt. Printer, Zomba. 1943. pp. 15.

05.3 (71.4). QUEBEC. **Report of the Minister of Lands and Forests of the Province of Quebec for the year ending March 31st, 1942.** King's Printer, Quebec. 1943. pp. 146.

05.3 (729.7). TRINIDAD AND TOBAGO. **Report of the agricultural policy of Trinidad and Tobago. (Part I).** Govt. Printer, Trinidad and Tobago. (Second printing). 1943. pp. 142. A.P.B.

05.3 (73). UNITED STATES. **Report of the Chief of the Soil Conservation Service, 1942.** Soil Conservation Service, U.S. Department of Agriculture. 1943. pp. 46. A.P.B.

05.3 (74.2). NEW HAMPSHIRE. **Annual report of the Director of the Agricultural Experiment Station for the period ending June 30, 1942.** *Bull. N.H. agric. Exp. Sta.* No. 345, 1942. pp. 69.

05.3 (78.6 : 79.6–7). UNITED STATES. **Eighth annual report of the Rocky Mountain Forest and Range Experiment Station, 1943.** U.S. Forest Service, Fort Collins, Colorado. 1943. pp. 8 + [3] + 46 + iv + dgms.

05.3 (932–9). FIJI. **Forest Department (Annual report for 1942).** *Council Paper* No. 19. 1943. pp. 5.

05.3 (94). AUSTRALIA. **Annual report of the Commonwealth Forestry Bureau for year 1942, prepared by the Inspector-General of Forests.** Commonwealth Govt. Printer, Canberra. 1943. pp. 12.

06. SOCIETIES. ASSOCIATIONS. CONVENTIONS. CONFERENCES

06.1 (71 : 73). HULL, C., PADDOCK, M., COOK, S. J., and HOWARD, P. A. (Compilers). **Handbook of scientific and technical societies and institutions of the United States and Canada.** *Bull. nat. res. Coun., Wash.* No. 106 (4th ed.), 1942. pp. 389. Price $4.00.

07. EDUCATION AND RESEARCH. EXPERIMENTAL GARDENS AND FORESTS

07.2 (485). Frågan om Skogsförsöksanstaltens omorganization. [The question of the reorganization of the Forestry Research Institute.] *Svensk PappTidn.* 46, 1943 (472–3). [Sw.] C.G.B.

The various Swedish associations and other bodies interested in the development of forestry and the wood industry, protest against the postponement of the reorganization of the Forestry Research Institute and point to the great importance of this Institute in assisting Swedish forestry to meet the urgent demands of present and future world conditions. M. L. C. W.

07.6 (82) : 23.24 : 12.26–8. SCHNABEL, P. Estación forestal demostrativa de Misiones. [The forest demonstration station of Misiones.] *Publ. misc. Minist. Agric. Argentina* No. 73, 1940. pp. 7. [Span.]

The station was founded at the end of 1937 with the aim of providing guidance in the large-scale afforestation work planned for this region. So far, the activities

of the station have consisted mainly in establishing model plantations of Eucalypts of different species and varieties.

09.1. *Forest History*

09.1 (41.5) : 97 : 94. FORBES, A. C. **Some early economic and other developments in Eire, and their effect on forestry conditions.** *Irish For.* 1 (1), 1943 (6–15).

The insular climate of Ireland has determined that crop growing is most successful between sea-level and 600 ft.; farms between 600 and 1,200 ft. are less highly cultivated and have a higher proportion of grazing land; above 1,200 ft. practical tillage and meadow land ceases and only rough grazing is possible. As grass grows for 10 months of the year, store cattle can be maintained without artificial feeding or housing—an advantage not possessed by any other European country. On the other hand, above 1,200 ft. economic forest crops are inhibited by low summer temperatures. From very early times these conditions caused a universal and minute division of the land into settlements averaging perhaps 300 acres each and hastened the destruction of natural woodland within their boundaries. The early system of land tenure persisted to the 12th century, when the country was subjected (in theory, at least) to the forest laws of the Normans, who also introduced fallow deer and protected rabbits. The writer suggests that the use of the word 'forest' in the legal language of grants, charters, etc., is responsible for exaggerated ideas of the extent of forests in the medieval period, and that historians of later periods have been similarly misled. By 1700—the low-water mark of native Irish woods—much had been cleared or incorporated with holdings. Within the subsequent 200 years the creation of demesnes throughout the country has brought under timber crops much first-class land which would otherwise have been farmed. Species planted included all European and eastern American trees of economic value; premiums for planting were granted in 1739–1808. Except for the relief work after the famine of 1845, tree planting languished until the Land Act of 1881 and the genesis of State action in Irish forestry.

09.1 (66.9) : 60.3. FAIRBAIRN, W. A. **Forestry in Plateau Province.** *Farm and Forest* 4, 1943 (182–92).

An account of the work on regeneration, exploitation, management, reservation, etc., both experimental and practical, that has been done to improve forest conditions in Plateau Province, Northern Nigeria, since forestry in this region came under the direct administration of the Nigerian Forest Department in 1915. It is pointed out that an ecological survey is required as the basis for future land classification and management in this Province.

09.2. *Pre-history*

09.2 (212). VUL'F, E. V. Paleoantarkticheskaya flora i znachenie eë dlya ponimaniya istorii florȳ severnogo polushariya. **[Paleoantarctic flora and its significance for the understanding of the history of the flora of the northern hemisphere.]** *Sovetsk. Bot.* No. 1, 1943 (15–28). [Russ.] O.B.D.

09.2 (410). GODWIN, H. **Neolithic forest clearance.** *Nature, Lond.* 153, 1944 (511–2). **[Botany School, Cambridge.]**

A review of publication No. 66 of the Danish Geological Survey entitled 'Landnam i Danmarks Stenalder' (Land occupation in Denmark's Stone Age) by J. Iverson. The author begins with the thesis that the Palaeolithic and Mesolithic men were hunters and fishers who brought about little modification of the natural vegetation in the lands in which they lived, a state of affairs which was radically altered with the arrival of Neolithic man.

In the Neolothic period Oak, Elm and Linden were the dominant species of the high forests, while Alder and Birch were found in the wetter parts and Pine and Birch in the drier areas. In the middle of the Oak period the pollen representation of *Ulmus* and of Ivy (*Hedera helix*) shows a conspicuous and consistent decrease, while that of *Fraxinus* shows an increase. In many Danish pollen diagrams a sudden change in forest composition occurs just above this climatically determined horizon. At Ordrup Mose, for example, the *Quercus*, *Tilia*, *Fraxinus* and *Ulmus* elements of the high forest undergo a temporary decline, while Hazel (*Corylus*) reaches its maximum representation, and *Betula* reveals a transitory and *Alnus* a more lasting increase in pollen frequency.

Iverson assumes that these changes are indicative of 'the vegetational developments in a region where land-tilling people have occupied the land and cleared this dense primeval forest with axe and fire'. The decline of the high forest tree-pollen curves is due to the local destruction of the dominant species, while the subsequent rise of Birch, Alder and Hazel is brought about by the rapid regeneration of these species in cleared areas.

Along with the general diminution in the amount of tree pollen is an increase in the pollen representation of weed species such as *Plantago major* and *P. lanceolata* which are commonly associated with human disturbance of the natural vegetation. When the initial phase of disturbance is past, the general forest composition shows little sign of permanent alteration until the beginning of the Iron Age.

09.2 (73). ANDREWS, H. N. **Contributions to our knowledge of American carboniferous floras. I. *Scleropteris*, gen. nov., *Mesoxylon* and *Amyelon*.** *Ann. Mo. bot. Gdn.* 29, 1942 (1–18 + plates). [Washington Univ.] H.S.B.

09.2 (73). ANDREWS, H. N., and PANNELL, E. **Contributions to our knowledge of American carboniferous floras. II. *Lepidocarpon*.** *Ann. Mo. bot. Gdn.* 29, 1942 (19–34 + plates). H.S.B.

09.2 (73). LENZ, L. W. **Contributions to our knowledge of American carboniferous floras. III. *Stipitopteris*.** *Ann. Mo. bot. Gdn.* 29, 1942 (59–68 + plates). H.S.B.

09.2 (73). PANNELL, E. **Contributions to our knowledge of American carboniferous floras. IV. A new species of *Lepidondenron*.** *Ann. Mo. bot Gdn.* 29, 1942 (245–74 + plates). H.S.B.

09.2 (73). ANDREWS, H. N. **Contributions to our knowledge of American carboniferous floras. V. *Heterangium*.** *Ann. Mo. bot. Gdn.* 29, 1942 (275–82 + plates). H.S.B.

09.2 (75.7) : 12.19.4 : 12.25–8. CAIN, S. A. **Pollen analysis of some buried soils, Spartanburg County, South Carolina.** *Bull. Torrey bot. Cl.* 71, 1944 (11–22). **[Univ. of Tennessee, Knoxville, Tenn.] O.B.D.**

Analyses were made of pollen profiles in four highly organic soils buried in the Piedmont, near Spartanburg, South Carolina, under several feet of inorganic material. The fact that pollen grains of *Picea* and *Abies* are more abundant in the lower half of the deposits indicates that the sediments accumulated in a climate which was becoming warmer. There is also some indication of the repeated destruction of the Oak/Hickory/Chestnut climax by fire, its replacement by Pine, and the subsequent restoration of the climax.

It appears that during the time of the sedimentation the uplands of the Spartanburg area were covered by an Oak/Hickory/Chestnut climax, while the ravines and protected slopes contained stands of mixed mesophytes. Postclimax Spruce/Fir grew on and around several bog-like basins where small streams were impounded. Over the upland itself the prevailing climax was broken by stands of Pine and Pine/hardwood mixtures representing various stages in the secondary succession.

09.2 (78.7) : 12.25 : 31.1. ANDREWS, H. N., and PANNELL, E. **A fossil Araucarian wood from western Wyoming.** *Ann. Mo. bot. Gdn.* 29, 1942 (283–6 + plate). [Washington Univ.] H.S.B.

A description is given of the fossil wood *Araucarioxylon wyomingense* sp. nov., based upon an examination of several small fragments and on a section of trunk 9 in. in diameter and 5 in. long. The most distinctive feature of the wood is the diminutive size of the rays.

09.2 (79.7). HANSEN, H. P. **Paleoecology of a peat deposit in east central Washington.** *Northw. Sci.* 17 (2), 1943 (35–40). Biol. Abstr. 18 (4109).

09.4. *Forest Statistics*

09.4 : 98.1. **World timber supplies.** Timber Development Association, Ltd., 75, Cannon St., London, E.C.4. 1944. pp. 27 + map.

The future productive capacity of the more important timber-exporting countries is discussed briefly with special reference to the supply of British requirements. The general thesis upheld is that there will be no shortage of standing timber and no lack of productive capacity.

09.4 (71.4) : 98.1. BOUCHER, G. **Les richesses forestières des Cantons de l'Est. [The forest riches of the Cantons de l'Est.]** *For. québec.* 7, 1944 (42–55). [F.]

Forest statistics are given for the counties of Dorchester, Beauce, Frontenac, Megantic, Wolfe, and Compton in the Province of Quebec.

09.4 (76.3) : 98.1–2 : 97 : 91. WINTERS, R. K., WARD, G. B., and ELDREDGE, I. F. **Louisiana forest resources and industries.** *Misc. Publ. U.S. Dep. Agric.* No. 519, 1943. pp. 17 + 44 + map. [Southern Forest Exp. Sta.]

This report is based on the findings of the U.S. forest survey in Louisiana. The forests of this State occupy 16·2 millions acres, or 56 per cent. of the total land area. Of this 15·8 per cent. is in the Longleaf Pine (*Pinus palustris*) type, 31·3 per cent. is in the Shortleaf/Loblolly Pine (*P. echinata*/*P. taeda*) and Shortleaf/Loblolly Pine/hardwood types, 5·8 per cent. is in upland hardwoods, and 47·1 per cent. is in bottomland hardwoods. Only 21 per cent. of the productive forest area supports old-growth forests and much of this has been heavily cut over. About 10 per cent. of the forest land is without forest growth as a result of fire and indiscriminate cutting.

The saw-timber volume totals 42·4 billion bd. ft., of which about two-thirds is hardwood and one-third Pine. Annual depletion is in excess of increment for Pines, while the reverse is true for hardwoods and Cypress. As a whole the forest volume is gradually increasing but principally in sizes and for species not now readily marketable.

Apart from the forest inventory this report deals with the economic aspects of forestry, the forest industries, and the possible contributions that private owners, the State, and the Federal Government can make towards improving forest conditions in Louisiana.

09.7. *Monographs of Individual Forest Regions*

09.7 (66.9) : 97.1 : 96.3. COSTELLO, J. W. **The forest conditions of south Ilorin.** *Farm and Forest* 4, 1943 (194–6).

Vegetation, soil conditions, and farming practices in this part of Ilorin Emirate, Nigeria, are referred to briefly. It is pointed out that there are still strips and patches of relatively accessible high forest in the region that contain valuable trees. Measures for the protection of this forest are suggested.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1 *Atmosphere*

11.13. Fogs and Clouds

11.13–4. CAVE, C. J. P. **Clouds and weather phenomena.** Cambridge University Press. (2nd ed.) 1943. pp. viii + 23 + plates.

A brief, illustrated account of clouds and weather phenomena, with particular reference to conditions in Britain. The various types of cloud formation are named and described, and short explanatory notes are given on sky phenomena, such as sunset colours, rainbows, halos, mirages, etc.

11.4. *Soil*

11.41. Soil Physics

11.41. TAYLOR, J. K. **A proposed classification of soil colour.** *Repr.* from *J. Coun. sci. industr. Res. Aust.* 16 (2), 1943 (74–84).

11.41–2 : 12.11.11 : 01.4. PIPER, C. S. **Soil and plant analysis. A laboratory manual of methods for the examination of soils and the determination of the inorganic constituents of plants.** University of Adelaide. 1942. pp. xiv + 368. [Waite Agricultural Research Institute.]

11.41–2. TAMM, O. **Om jordanalyser i praktikens tjänst inom jordbruk och skogsbruk. [Soil analyses in the service of agriculture and forestry.]** *Skogen* 29, 1942 (300–2). [Sw.]

Analyses of various kinds have now become an important means of soil evaluation in relation to agriculture, and the methods of analysis employed have

proved their value in a large number of field experiments.

Corresponding forestry problems are considerably more difficult to solve. This is due to many causes; *inter alia* to the fact that field experiment in forestry is time-absorbing and difficult to conduct compared with that in agriculture.

Apart from the geological nature and humus condition of the forest soil, there are a number of soil characters which exert a considerable influence on the forest plant, and which it would therefore be desirable to have analysed; for example, the content of secondarily formed colloids which affect in a high degree both the moisture-retaining capacity and the nutritive condition of the soil.

The direct utilization of soil analysis in practical forestry presents great difficulties, but in agriculture considerable progress has been made in the solution of corresponding problems. R. P. J.

11.43. Biology of Soil, including Mycorrhiza

11.43.1 : 12.25. FERREÍRA DOS SANTOS, N. Micorrizas endotróficas do género *Sequoia* Endlicher. **[Endotrophic mycorrhizae of the genus *Sequoia* Endlicher.]** *Abstr.* in *Rev. agron., Lisboa* 30, 1942 (461). [Port.] [Serviços Florestais.] L.S.

Mycorrhizal formations observed at Sintra on roots of *S. sempervirens* and *S. gigantea* are described; the mycorrhizae are assigned to the *Visicula-Arbusculo* group.

11.43.1 : 11.42.1 : 12.25 : 12.26–8 : 12.21. ROSENDAHL, R. O. **The effect of mycorrhizal and nonmycorrhizal fungi on the availability of difficultly soluble potassium and phosphorus.** *Proc. Soil Sci. Soc. Amer. 1942* 7, 1943 (477–9). [Univ. of Wisconsin, Madison, Wis.] A.P.B.

Red Pine (*Pinus resinosa*) and American Elm (*Ulmus americana*) were grown in sand cultures in which 40- to 60-mesh orthoclase and apatite were the only potassium and phosphorus sources, respectively.

Pine seedlings grown in sand-orthoclase media inoculated with *Boletus felleus* showed much greater growth and potassium absorption than control seedlings or those inoculated with *B. granulatus* or *Amanita muscaria*. Seedlings inoculated with *B. felleus* and transplanted to a mycorrhiza-free prairie soil, developed mycorrhizae and showed greater growth and survival than other seedlings. Inoculations failed to stimulate the growth of Pine seedlings in the sand-apatite cultures.

Elm seedlings in sand-orthoclase media were not stimulated by any fungi, while the growth of Elm in sand-apatite media was increased by the presence of mycorrhizal and non-mycorrhizal fungi alike. Chemical analyses indicated that both types of fungi increased the solubility of the phosphorus of apatite, though no increase in the solubility of the potassium of the orthoclase was detected. *From author's summary.*

11.6. *Hydrographical Conditions. Water and Soil Conservation*

11.62 : 11.14.3 : 91.3. WILM, H. G. **Determining net rainfall under a conifer forest.** *J. agric. Res.* 67, 1943 (501–12). [Rocky Mt. Forest and Range Exp. Sta.] O.R.E.

The results obtained from the experiment described indicate a significant relationship between degree of timber cutting and the amount of rainfall reaching the ground; net rainfall appears to vary in linear relation to the intensity of cutting. However, there was no appreciable increase in net rainfall following the removal of undesirable trees in timber stand improvement work and it is presumed that the effect of such cuttings is obscured by variations in stand density that are not readily measurable.

It is pointed out that with certain modifications the experimental design used in this study should prove satisfactory in other forest types. *From author's summary.*

11.62 : 11.41.1 : 11.11.2 : 12.19.2–3. POST, F. A., and DREIBELBIS, F. R. **Some influences of frost penetration and microclimate on the water relationship of woodland, pasture, and cultivated soils.** *Proc. Soil Sci. Soc. Amer. 1942* 7, 1943 (95–104). [North Appalachian Experimental Watershed, U.S. Soil Conservation Service.] A.P.B.

Experiments were undertaken to determine the effects of frost penetration and snow depth on the hydrological characteristics of important soils on the watershed of the Northern Appalachian Region. Measurements were made in woodland, pasture, meadow and cereal covers on various slopes and aspects and two different soil types for three successive winters.

Little difference was found in frost depths under pasture and meadow covers, while the greatest frost depth was found under wheat and only traces of frost (less than ½ in.) were recorded in the woodlands. Where frost penetrated to a depth of 3 in. or more, percolation was greatly reduced or ceased entirely. One of the most important characteristics of frozen soil was the high concentration of moisture at or near the surface.

11.62.1 (51 : 73). LOWDERMILK, W. C., and WICKES, D. R. **China and America against soil erosion. I. The fate of conservation in northern Shansi. II. Losses and gains.** *Sci. Mon., Wash.* 56, 1943 (393–413; 505–20). [U.S. Soil Conservation Service.] P.O.

A review of historical records of destructive erosion and flooding in China from very early times, particularly in so far as these have been brought about by the clearing of forests. Three main periods in the treatment of Chinese forests have been distinguished by Teng Shu-chun [*J. For.* 25, 1927 (564–70)]:—(1) the Ancient Period, from earliest times to about 1,100 B.C., (2) the Golden Period, from 1,100 B.C. to 250 B.C., and (3) the Dark Period from 250 B.C. to A.D. 1911. During the Golden Period astounding progress was made in forest and land conservation, but in the Dark Period which followed the regulations regarding forest exploitation were largely disregarded, and only in temple groves is it now possible to find remnants of the original forests of the Golden Period. With the establishment of the Republic in 1912 there was begun a new period which may be called the Period of Reconstruction. As in America, modern scientific methods in agriculture, forestry and engineering are now being brought to bear on the twin problems of erosion and flooding. A short comparative account is given of soil conservation movements in China and the United States.

11.62.11 (74). ALTPETER, L. S. **Use of vegetation in control of streambank erosion in northern New England.** *J. For.* 42, 1944 (99–107). [White River Soil Conservation District, Randolph, Vt.]

This article presents preliminary conclusions with

respect to the basic principles of streambank erosion control and describes in detail the use made of vegetation in the control programme on the Winooski River in Vermont.

Engineering structures are used to protect the lower 5 ft. of banks exposed to the action of the stream current and woody vegetation is used on the upper slopes. Methods of establishing the vegetation are described, the material used being hardwood species and hybrids that develop from cuttings; a variety of species is used so as to afford protection against fungi and insect pests. It has been found that woody vegetation exposed to flood and ice action should either be of a shrub type, or should be cut back frequently enough to preserve a pliable growth.

12. FOREST BOTANY. TREE SPECIES

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

12.11.1 *Metabolism. Plant Constituents. Sap Flow. Growth Substances. Reserve Materials*

12.11.12 : 12.26–8. FRIES, N. Zur Kenntnis des winterlichen Wasserhaushalts der Laubbäume. [On the winter water régime of broadleaf trees.] *Svensk bot. Tidskr.* 37, 1943 (241–65). [G.] L.S.

This paper gives an account of field investigations on variations in the water content of young shoots of various hardwoods (mostly 1-year-old Birch shoots) during periods of cold weather in the winters of 1940–41 and 1941–42, and particularly during the period between the beginning of January and the end of March 1942. In March of the following year smaller laboratory investigations were carried out on the possibility of water transport in shoots at a temperature below freezing point. From the results obtained it appears that no movement of water can take place within a shoot at a temperature below 0° C. In such circumstances the various parts of the shoot (catkins, buds, etc.) are completely dependent upon their own water reserves.

12.11.14 : 12.29. RATWITSCHER, F. K., and FERRI, M. G. Observações sobre a metodologia para o estudo da transpiração cuticular em plantas brasileiras, especialmente em *Cedrela fissilis*. [Observations on methods for the study of cuticular transpiration in Brazilian plants, particularly *Cedrela fissilis*.] *Botanica* No. 3, 1942 (113–33 + [3] + plate). [Port. port.e.] (*Bol. Univ. S. Paulo, Fac. Filos. Ciénc. Let.* No. 28.) A.P.B.

12.11.15 : 12.11.22. THIMANN, K. V. Growth hormones in plants. *Publ. Smithsonian Inst., Wash.* No. 3666, 1942 (393–400 + plates). From *Smithsonian Rep.* for 1941. [Harvard Biological Laboratories, Cambridge, Mass.]

The author traces the various stages in the discovery of the existence and properties of growth hormones in plants from the first observations made by Paál in Hungary in 1919. Paál observed that when the tips of the coleoptiles of wheat or oats were removed and replaced asymmetrically the curvature of the stem was influenced by the mode of replacement, quicker growth taking place on the side of the plant in contact with the tip.

The next step was the discovery by Went in Holland in 1928 that if the tips were placed in a jelly of agar or gelatin, this jelly also acquired the property of hastening the growth of a coleoptile stump. Other active compounds (auxins) have since been synthesized and produce similar effects.

A survey of the distribution of auxin in plants revealed that it occurs mainly in growing buds and young leaves. The auxin produced by the terminal bud appears to have two functions: to stimulate the growth of the stem and to inhibit the growth of buds below it. The effect of auxins is therefore not uniform throughout the plant.

The auxin treatment of cuttings in order to promote more rapid rooting is usually successful, but plants vary in their response to such treatment. In the case of some "difficult" plants (e.g. Canadian Hemlock and Blue Spruce) rooting may be readily obtained if care is taken and the auxin applied at the right concentration. In other plants, such as White Pine and Norway Spruce, only cuttings taken from young trees can be expected to root successfully. In some conifers there is a difference in response between the lateral shoots and the apical or terminal shoots, the former tending to strike root more readily.

The most remarkable example of variation in response shown by different parts of the same plant was revealed in experiments with the slit stems of young pea plants placed in auxin solution. In these experiments the outside tissues responded by more rapid growth than that of the corresponding inner tissues.

12.11.15 : 12.11.22 : 12.26–8. KOBERIDZE, A. The comparative effect of heteroauxin on the rooting of cuttings of certain plants. *Trav. Inst. bot. Tbilissi* No. 7, 1939 (181–7). [Georgian, russ.e.]

An account is given of experiments carried out at Tbilissi in order to establish any differences that may exist between heteroauxins of American and Soviet manufacture, the latter prepared at the biochemical laboratory of the Sukhumi nursery. The two types of heteroauxins proved roughly equivalent; both had a favourable effect on the rooting of cuttings of *Morus alba*, *Nerium oleander*, *Populus pyramidalis*, and *Salix viminalis*, and neither was effective in rooting cuttings of *Olea europaea* and *Populus euphratica*.

12.11.2. *Propagation. Growth. Development*

12.11.21 : 12.25–8 : 12.11.3. JOHNSON, L. P. V. The storage and artificial germination of forest tree pollens. *Canad. J. Res.* 21, Sec. C, 1943 (332–42). [National Research Laboratories, Ottawa.] P.R.

The physical and nutritional requirements for pollen germination in several forest tree species were studied by using a variety of nutrient combinations in agar, silica gel, and distilled water media. It was found that 10 per cent. sucrose in 0·75 per cent. agar was the best of these media for *Pinus* pollen, while 1·13 per cent. bean pod agar was best for *Picea*.

Results from studies on light and dark incubations of *Pinus*, *Picea*, and *Quercus* pollens showed no significant difference in percentage germination, but indicated a stimulation of pollen tube growth by light.

Pollens of several species were stored under different conditions of relative humidity (graded series, 0 to 75 per cent.), temperature (2° C. and room temperature), and light (light and dark). Data on germination after storage for one year showed:—that pollen longevity of all viable species was greatly favoured by low temperature and darkness; that the best relative humidity was

15 to 35 per cent. at room temperature and 50 to 75 per cent. at 2° C. for *Pinus*, 15 per cent. at room temperature and 10 to 75 per cent. at 2° C. for *Picea*, and 25 to 35 per cent. at 2° C. (no germination at room temperature) for *Quercus*.

Highest percentage germination after storage for one year ranged from 95 to 99 per cent. for *Pinus* species, 58 to 63 per cent. for *Picea* species, and 46 per cent. for a *Quercus* species (2° C., dark, in each case).

In all species successfully stored, pollen germination was higher after 12 months' storage than after eight months' storage. *Author's summary.*

12.11.21 : 12.26–8. WEBSTER, C. C. **Observations and experiments on flowering and pollination of the Tung tree.** *E. Afr. agric. J.* 9, 1944 (136–43). [Tung Exp. Sta., Nyasaland.]

12.11.22 : 12.11.15. GARNER, R. J. **Propagation by cuttings and layers. Recent work and its application, with special reference to pome and stone fruits.** *Tech. Commun. Imp. Bur. Hort. Plantat. Crops* No. 14, 1944. pp. 79. [East Malling Research Station.]

12.11.22 : 12.25 : 12.11.15. MIROV, N. T. **Experiments in rooting Pines in California.** *J. For.* 42, 1944 (199–204).

A critical review is given of the existing literature dealing with experimental work on the propagation of Pines by cuttings, followed by a brief account of experiments carried out by the author on rooting cuttings of various Pine species, chiefly Ponderosa Pine. From the evidence available it appears that: (1) the beneficial effect of hormone-like stimulators on the rooting of Pine cuttings is not clearly established; (2) the rooting capacity of cuttings does definitely decrease rapidly with increase in age of the tree from which they are taken; (3) the position of the branch from which cuttings are taken determines to some extent their rooting capacity.

12.11.22 : 12.26–8 : 23.25. STOUTEMYER, V. T., O'ROUKE, F. L., and STEINER, W. W. **Some observations on the vegetative propagation of Honey Locust.** *J. For.* 42, 1944 (32–6). [U.S. Bureau of Plant Industry and Soil Conservation Service, Md.]

This paper presents the results of experiments in the vegetative propagation of Honey Locust (*Gleditsia triacanthos*) by grafting, budding, and cuttings. Grafting and budding tend to be costly and to provide stock that will sucker badly from the basal regions. Root cuttings appear to give the most promise for the reproduction of desirable strains at reasonable cost; experiments indicate that cuttings of relatively large diameter should be used. Based on present experience, hardwood and greenwood cuttings cannot be recommended for large-scale production.

12.11.23 : 12.11.15. GOUWENTAK, C. A. **Cambial activity as dependent on the presence of growth hormone and the non-resting condition of stems.** *Proc. Acad. Sci., Amsterdam* 44, 1941 (654–63). [E.] Chem. Abstr. 37 (412). P.R.

Heteroauxin, or its Na salt, activates the cambium to produce early wood throughout the whole length of shoots, provided the shoots are in a non-resting condition. This condition can be hastened by an ethylene chlorohydrin treatment, but this alone does not activate the cambium. Heteroauxin can also activate resting cambium but only in the immediate vicinity of wounds. The wood produced in this way varies from undifferentiated cells to real springwood.

12.11.23 : 12.25 : 44.1. PESSIN, L. J., and CHAPMAN, R. A. **The effect of living grass on the growth of Longleaf Pine seedlings in pots.** *Ecology* 25, 1944 (85–90). [Southern Forest Exp. Sta., New Orleans.]

Longleaf Pine (*Pinus palustris*) seedlings were grown for a period of 2 years in 1-gal. metal containers in some of which grass was sown while the remainder were kept free of grass. Two watering schedules were tested—at 250 and 500 ml. weekly. Where Pines were grown with grass (pure broomsedge and a mixture of other species), the vegetation cover was either (*a*) burned off once a year, the ashes being returned to the soils in the containers, (*b*) clipped twice a year, or (*c*) left undisturbed ('rough') as a check.

The average dry weight of the Pine seedlings grown in cultures without grass was significantly greater than that of seedlings grown in cultures with grass in the rough condition, but it was not significantly influenced either by mulching or by the amount of water applied.

Analysis of the seedlings grown with grasses under the three different conditions (*a*, *b* and *c*) noted above, showed that the average dry weight of Pines grown with burned broomsedge was significantly greater than that of Pines grown with clipped broomsedge, which in turn was significantly greater than the average dry weight of those grown with 'rough' broomsedge. No significant differences in average dry weight appeared, however, among Pines grown with mixed species other than broomsedge, subjected to the same three treatments.

Of the Pines grown with broomsedge, those receiving 500 ml. of water showed a significantly greater average dry weight than those receiving 250 ml., though this difference was not observed for Pines growing with mixed grasses other than broomsedge.

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance*

12.11.3 (485) : 31.8 : 33.15 : 12.26–8. SYLVÉN, N. Skogsträdsförädlingen under 1941. Från föreningen för växtföradling av skogsträd verksamhet. [**The breeding of forest trees during 1941. Notes on the work of the Association for the Breeding of Forest Trees.**] *Skogen* 29, 1942 (173–5, 202–4). [Sw.]

This paper includes an account of an investigation undertaken with the object of selecting veneer Birch for special purposes, the selection being made primarily on a botanical basis, all trees being described. These morphological descriptions were used in conjunction with results from a study of the timbers at a plywood factory as a basis for quality determinations in the field. From this work it was evident that, in accordance with the principles applied in taking the samples, it would be possible to formulate instructions for selecting plywood Birches for particular purposes.

This line of work in Norrland was followed up by the Association which in 1941 began an investigation at the State Testing Institute, Stockholm and at the chemical laboratory of the Association at Ekebo on the quality of the wood of northern and central Swedish Birch.

M. L. C. W.

12.11.3 (489) : 21 : 23.21. SYRACH LARSEN, C. De enkelte Arters Anvendelse, Proveniens og Foraedling. [**The use, provenance and breeding of various tree**

species.] *Svenska SkogsFören. Tidskr.* 41, 1943 (182–99). [Dan.] N.D.A.

Additional information relating to the second part of the paper noted in *For. Abstr.* 4 (250–1) is given in the following abstract.

The author reviews, with historical notes, the main conifers and some deciduous tree species of Denmark (e.g. *Acer saccharum, Castanea vesca, Populus* sp.); the subject is treated from the standpoint of their provenance, uses in Danish forestry and present distribution in various part of the country. Particular features such as suitability for shelterbelts, resistance to salt-water spray, hardiness, resistance to various fungous diseases and soil requirements are mentioned.

In stressing the importance of provenance, it is pointed out that in Denmark it may often be advantageous to use a climatype from a country with a slightly more favourable climate than that of Denmark; the examples cited include (1) the Dutch Oak, (2) the Czechoslovak Beech, which has the additional advantage of a better form type, and (3) the Polish Aspen. Such importations should be made preferably from southern countries rather than from the north.

The provenance problem for Denmark no longer involves only the finding of suitable foreign species but also the introduction of new races of Danish native species. Not only must the satisfactory climatype be found but also the best form types. Furthermore, it may be advantageous to grow hybrids between species already in cultivation, e.g. White Spruce × Sitka Spruce and European × Japanese Larch.

The contribution of Danish breeders to forest tree improvement is illustrated by reference to the following points:—

The technique of seed production by artificial pollination of 'dwarf seed trees' obtained by grafts made from superior trees is used in the crossing of apparently highly desirable types and has been very successfully applied in crossing European and Japanese Larch; these hybrids are very fast growing and have other valuable features. Heterosis has also been found in Japanese × Siberian Larch, but this hybrid apparently needs a colder climate and might well be tried in Iceland.

A triploid has been obtained in a cross between European and Western American Larch (*Larix occidentalis*) and it is hoped by crossing it with the Japanese species to get a tetraploid Larch. The plants of one small sowing of triploid × diploid Larch, involving three species, show considerable variation. The aim here too was to obtain a tetraploid form for use in further breeding operations.

Work is also being done with a tetraploid *Alnus subcordata*, some triploids, and a number of normal diploids and hybrids between them, and a few plants have been produced that are completely hardy, excel the various original products in growth, are presumably of silvicultural value and are easily propagated vegetatively, though their taxonomic position is impossible to define at present.

Apart from species crosses and polyploids there have been marked developments in work with pure species. For example, on the basis of the oldest Danish plantings of Douglas Fir and A. Oppermann's extensive research on provenance, it is possible to obtain a satisfactory climatype and a good form type of this species. In future selection to improve the phenotype, resistance to *Phaeocryptopus gäumanni* must, where necessary, be taken into account. The procedure adopted is described. Similar work has been done on Red Spruce resistance to *Chrysomyxa abietis* and a few of the oldest and silviculturally most valuable specimens appear to be immune to the disease.

Some Aspens (*Populus tremula*) of Polish provenance obtained for research purposes seem to be surpassing trees of the native provenance in growth. A way of propagating this valuable clone has been devised [cf. Muhle Larsen in *Dansk Skovforen. Tidskr.* March, 1943].

In spite of its difficulties, grafting of the best individuals is stressed as highly important in seed raising. Grafting on older trees direct in the forest is also useful. Good results have been obtained in the Danish arboretum with Larch, Ash, Oak and Aspen, and some experiments with Douglas Fir, Red Spruce (rødgran) and Scotch Pine (skovfyr) seem promising. M. L. C. W.

12.11.3 : 01.4. DORMAN, K. W., SCHOPMEYER, C. S., and SNOW, A. G. **Top bracing and guying in the breeding of Southern Pines.** *J. For.* 42, 1944 (140–1). [Southern Forest Exp. Sta.]

In order that breeding operations such as bagging and pollination may be carried out in Slash Pine (*Pinus caribaea*) and Longleaf Pine (*P. palustris*), it is necessary to brace the tops of the trees to prevent breakage and provide efficient working conditions. Bracing consists of three pieces of 2 × 2 in. Pine 10–16 ft. long, firmly bound to the main stem and extending to the top of the tree. Three guy wires are fastened between the braces and nearby stumps or trees to prevent swaying.

12.13. Embryology

12.13 : 12.25 : 12.11.15. LOO, S. W., and WANG, F. H. **The culture of young conifer embryos in vitro.** *Science* 98, 1943 (544). [National Univ. of Peking, China.] L.S.

A preliminary report on the culture of very young, isolated embryos of *Pinus yunnanensis* and *Keteleeria davidiana* at the one- or several-cell stage in a modified Pfeffer's solution containing 2 per cent. sucrose and 0·6 per cent. agar. To this medium various growth substances were added. The results indicate that conifer embryos of one to several cells in size can probably develop normally *in vitro* in the presence of heteroauxin and thiamin, at least for a time. It is possible that they may even grow to maturity *in vitro* if the proper growth factors are added to the medium.

12.13 : 12.26–8. STEINBAUER, G. P. **Frequency of polyembryony in *Fraxinus* seeds.** *Bot. Gaz.* 105, 1943 (285). O.B.D.

Examination of a number of soaked samaras of four species of *Fraxinus* indicated that the frequency of two seeds per fruit varied from 0·71 per cent. in the case of *F. nigra* to 7·00 per cent. in the case of *F. velutina*. Twin embryos occurred in 0·11 per cent. of the fruits of *F. nigra* and *F. americana*, and in 0·13 per cent. of the fruits of *F. velutina*. The origin of the plural embryos is not known.

12.14. Organography. Morphology. Anatomy. Histology

12.14.5 : 12.26–8. CHODAT, F. Croissance et caractères spécifiques des feuilles d'érables. [**Growth and**

ecific characters of Maple leaves.] *C.R. Soc. Phys. ist. nat., Gèneve* 59 (1), 1942 (69–72). [F.] [Univ. de enève.] L.S.

As a rule, biological observations are based primarily pon the form assumed by adult organs, but the large mber of such forms frequently complicates research n the natural affinities existing between the objects bserved. Biological forms, no matter how numerous nd diverse they may be, are nevertheless the result f a limited number of forces acting upon material less iverse than is generally supposed, and organogenesis aches us that specific differences, which may be egligible in the immature stages, become more pro- ounced in the course of growth. In the species *Acer mpestre*, *A. opalus* and *A. monspessulanum*, for xample, the fundamental number of lobes in the leaf lade is 5, although in the last-named species two of the bes do not develop. *A. monspessulanum* forma *icrophyllum* sometimes bears two types of leaves on ne same branch, one type 3-lobed and the other 5-lobed.

The author has developed mathematically a method hereby cases of hybridization or introgression, or the ansition of one or more characters of one species of laple into individuals of another species are made vident.

2.14.5 : 12.25–8. Gustafson, F. G. Decomposition f the leaves of some forest trees under field conditions. *lant Physiol.* 18, 1943 (704–7). [Univ. of Michigan, nn Arbor, Mich.] O.B.D.

The rate of decay of leaves of Sugar Maple and ickory was found to be much more rapid than that of ak leaves in which parenchymatous tissue quickly isintegrates but the petioles and larger veins may last or many years. A mixture of Pine and hardwood eaves resulted in an increased rate of decay for both ypes.

2.14.5 : 12.26–8. Plymale, E. L., and Wylie, R. B. The major veins of mesomorphic leaves. *Amer. J. Bot.* 1, 1944 (99–106). [Univ. of Iowa, Iowa City.] O.B.D.

A study was made of the major veins of certain nesomorphic leaves, including those of *Cercis canaden- is*, *Liriodendron tulipifera*, *Tilia americana*, *Ulmus americana*, *Acer saccharum*, *Quercus macrocarpa*, *Popu- us nigra* var. *italica*, and *Catalpa speciosa*. Observa- ions are given on the size of the leaf, on tissue distribu- ion, and on vein length and conductive capacity. Particular attention is paid to the contrast between najor and minor venation.

2.14.7 : 12.25 : 44.3. Kottrekord från Blekinge. [Re- ord number of cones from Blekinge.] *Skogsägaren* 18, 942 (36). [Sw.]

A cluster of 145 cones was found at the base of the op shoot of a young Pine tree 1·95 m. high that had rown from seed sown in 1927. It stood in a fairly open osition and, apart from cone disease, appeared to be ormally developed. R. P. J.

2.14.7 : 12.25 : 12.19. Danilov, D. N. Izmenchivost' emennykh cheshuy *Picea excelsa* Link. [Variability of he cone scales of *Picea excelsa* Link.] *Bot. Zh. S.S.S.R.* 28, 1943 (191–202). [Russ.f.] C.G.B.

The various types of cone scales obtained from a arge number of specimens in the region 32°30′– 6°45′ E. longitude and 56°05′–60°45′ N. latitude of European Russia are described and classified. Many f the scale forms are intermediate between those of *P. bies* [=*excelsa*] and *P. obovata*, and there is no sharp morphological differentiation between the two species; in most parts of European Russia the intermediate forms are more frequent than those characteristic of either species. In general, the Spruce types become progres- sively more characteristic of *P. abies* and less so of *P. obovata* as one passes from the Ural to the western border of the Soviet Union. The terminal angle of the scales, which is an important diagnostic character, shows a consistent diminution and, at the same time, the cones increase in length and weight. *P. abies* has an increasing area of distribution and shows a greater variety of forms than *P. obovata*.

12.19. Geographical Distribution. Plant Geography and Sociology

12.19 : 12.2 : 13.2 : 45.3. **Inter-relations of plants and insects.** *Nature, Lond.* 153, 1944 (424–6).

A summary of some of the views expressed at a joint discussion between the British Ecological Society and the Royal Entomological Society of London on November 12, 1943, on 'The inter-relations of plants and insects: the place of both in the eco-system'. The problem of the relationship between plants and insects is a very complex one and requires a great deal of further study. Among the points raised in the dis- cussion was the marked preference of certain insects for specific food plants, although insect larvae which in the wild state are found on one food plant only can some- times be reared in captivity on a number of species. The same plant species may also support different insects in different localities. Insects which are to-day largely confined to artificial habitat conditions may in former times have occupied similar, though much less common habitats created by natural agencies, or they may have arisen as the results of the widespread occur- rence of such habitats. The distribution of some species has become limited to special ecological condi- tions or to a special food plant.

From the point of view of forestry, it is noted that virgin forests are characterized by freedom from insect epidemics unless disturbed by some external factor which upsets the equilibrium, and pure forests are known to be more liable to outbreaks of insect pests than are mixed forests. The influence of insect attack on the specific composition of vegetation is relatively greater in the earlier stages of plant colonization or succession when competition between species is relatively severe.

12.19 (469). Pedro, J. G. Estudo geobotanico da Serra da Arrábida. [Geobotanical study of Serra da Arrábida.] *Agronomia Lusitana* 4, 1942 (101–36 + map). [Port.port.e.]

The climax vegetation of the southern slope of this mountain range (some 30 km. south of Lisbon) is characterized by formations of *Ceratonia siliqua* and *Olea oleaster*, and that of the northern slope by *Quercus suber* and *Q. faginea* formations.

12.19 (485) : 11.45.4. Eklund, B. Sambandet mellan berggrundens beskaffenhet och frekvensen av olika trädslag och skogssamhällen inom Jämtlands län: en undersökning på grundval av material från 1939–40 års riksskogstaxering. [The connexion between the nature of the bedrock and the distribution of various tree species and forest types in the province of Jämtland: an investigation based on material from the 1939–40 State forest survey.] *Svenska SkogsvFören. Tidskr.* 41, 1943 (20–39). [Sw.sw.]

Marked differences are shown to exist in stand composition and forest type on areas of different bedrock constituents. On areas of Cambro-Silurian origin or supplied with material from such rock, Spruce was prevalent and the forests were frequently of the *Dryopteris* type and rich in herbs, whereas on poorer rock such as porphyry, sandstone, quartz and sparagmite, Pine increased in frequency and the forests were rich in lichen. Although differences in individual stands or smaller tracts may be conditioned by local hydrological, topographical, climatic, and possibly other causes, the considerable differences in the general appearance of the forest associations are to be attributed to the influence of the bedrock.

12.19 (75) : 12.25 : 43. OOSTING, H. J. **The comparative effect of surface and crown fire on the composition of a Loblolly Pine community.** *Ecology* 25, 1944 (61–9). [Duke Univ., Durham, N.C.]

The study described in this paper was made in a 35-year even-aged Loblolly Pine (*Pinus taeda*) stand in Orange County, North Carolina. Nine years after surface and crown fires had taken place the herbaceous vegetation in the burnt part of the stands was little different from that in similar unburned areas. The distribution of shrubs and vines also showed little change, except for an increase of virginia creeper and poison ivy on the area subjected to surface fire. In this area, however, the total basal area of the dominant Pines was slightly less than would have been the case if fire had been excluded, and hardwoods (particularly Oaks and Hickories) in the lower strata had increased both in numbers and size, thus tending to speed up Oak/Hickory dominance. The crown fire resulted in a 98-per-cent. loss of basal area in the Pines of the dominant stratum, but many Pine seedlings had become established since the fire and were competing successfully with hardwood saplings and sucker sprouts. It appears that a mixed Pine/hardwood stand may be expected as a result of a serious crown fire in this area.

12.19 (77.8). BRENNER, L. G. **The environmental variables of the Missouri Botanical Garden Wildflower Reservation at Gray Summit.** *Ann. Mo. bot. Gdn.* 29, 1943 (103–35). H.S.B.

This paper presents a preliminary survey of the geology, physiography, soils, climatology and vegetation of a characteristic area in the Wildlife Reservation of the Missouri Botanical Garden. The arborescent flora is a complex one composed of 40 species, representing 28 genera. The large number of species and the relatively wide distribution of many of them in the area may be attributed largely to human occupation rather than to natural causes. The area as a whole has been generally and quite intensively grazed, and approximately half of it has been deforested. Grazing and firing of the forest floor in earlier times led to the invasion of some parts by various heliophilous plants, notably *Juniperus virginiana*, *Ulmus fulva*, and *Cercis canadensis*. Apart from these plants, the vegetation of the area may be arranged in three principal groups: (1) the *Quercus/Carya* association, (2) the *Quercus alba/Acer saccharum* association, and (3) the *Quercus muhlenbergii/Acer saccharum* association. The open glade associes contains practically no arborescent flora, but the closed glade associes is forested with *Juniperus virginiana* and other tree species, including *Quercus muhlenbergii* and *Bumelia lanuginosa*.

12.19 (78) : 12.25 : 21.2–3 : 11.41.1 : 42.22. DAUBENMIRE, R. F. **Soil temperature versus drought as a factor determining lower altitudinal limits of trees in the Rocky Mountains.** *Bot. Gaz.* 105, 1943 (1–13). Q.B.D.

Greenhouse studies were made with seedlings of various coniferous species to determine whether the lower altitudinal range limits of these species in the Rocky Mountain forests are due primarily to differences in tolerance of high soil-surface temperatures, or to variations in ability to withstand atmospheric or soil drought.

In general, seedlings of species having a lower altitudinal distribution showed a greater tolerance for high soil-surface temperatures, but since the maximum temperatures which could be tolerated by individual species far exceeded the maximum temperatures obtaining in numerous micro-habitats below their lower altitudinal range, high temperature could not be regarded as the main limiting factor in altitudinal distribution.

Atmospheric drought also appeared to have no direct importance in determining the lower limits of the trees. However, species with a lower altitudinal range generally showed more rapid rates of root penetration, and also a greater capacity for enduring soil drought than species with higher ranges. Since the intensity and duration of drought has been shown to increase downslope in the area under review, this factor appears to offer at least a partial explanation of the difference in lower range limits.

12.19 (81) : 11.62 : 12.11.14 : 11.21. RAWITSCHER, F. K. Problemas de fitoecologia com considerações especiais sobre o Brasil meridional. [**Problems of phytoecology, with special reference to southern Brazil.**] *Botanica* No. 3, 1942 (3–111). [Port.port.e.] (*Bol. Univ. S. Paulo, Fac. Filos. Ciénc. Let.* No. 28). A.P.B.

This paper is the first of a series aiming at an account of the ecological factors that have influenced Brazilian vegetation. It deals with the significance and purposes of phytoecology generally, and with the factors temperature and humidity, and is based on literature data (115 references) and the writer's own observations. It is emphasized that the amount of water transpired by a forest with ample foliage can exceed that evaporated from a free water surface of the same area; that, other conditions being equal, the subterranean water reaches a lower level in forests than in areas having an open vegetation; that many areas of dry appearance (savannas, etc.) have large water reserves that are accessible to deep roots and would be covered by forest vegetation in the absence of fires and other types of damage; and that a large part of south-central Brazil has a forest climate, and not, as is frequently assumed, a savanna climate. *From author's summary.*

12.19 (82) : 23.21 : 12.26–8. BEETLE, A. A. **Phytogeography of Patagonia.** *Bot. Rev.* 9, 1943 (667–79) [Univ. of California.]

The flora of Patagonia is mainly xerophytic, in contrast to the hydrophytic flora which borders it on the west. In the predominance of shrubs over a sparse herbaceous layer to the general exclusion of trees, and in the comparative poverty of the flora, Patagonia closely resembles the Great Basin region of western North America. Recent introductions of economic importance, which, however, have no bearing on the historical phytogeography of the region, are the

merican Willow (*Salix humboldtiana*) and the African
marisk (*Tamarix gallica*).

12.19.1 *Regional Floras, including Check Lists*

.19.1 (54.8) : 12.26–8. THIRUMALACHAR, M. J., ASHEER AHMED KHAN, K., and SWAMY, B. G. L. **me common flowering plants of Nandi Hills.** *Half-ly. J. Mysore Univ.* (*n.s.*), Sect. B., 3 (1), 1942 (73–88). Central College, Bangalore.] L.S.

This paper consists of a list of flowering plants digenous to or cultivated in the Nandi Hills, north of ngalore, with short descriptions of the native and of me of the cultivated species. Tree species include presentatives of the following families:—Moraceae, lmaceae, Santalaceae, Olacaceae, Lauraceae, Legu-inosae, Linaceae (Erythroxylaceae), Rutaceae, Meli-eae, Euphorbiaceae, Anacardiaceae, Sapindaceae, amnaceae, Vitaceae, Tiliaceae, Combretaceae, Arali-eae, Sapotaceae, Boraginaceae, Verbenaceae, and biaceae.

.19.1 (72). GENTRY, H. S. **Rio Mayo plants: a study the flora and vegetation of the valley of the Rio ayo, Sonora.** *Publ. Carnegie Inst. Wash.* No. 527, 42, pp. vii + 328 + plates + map. Price $2.75. P.B.

This volume brings together records of the author's tanical collections in the valley of the Río Mayo ich drains the western face of the great western rdillera of Mexico, as well as his observations on the ography and physical features of the area, and the tribution and composition of the vegetation. The roductory section on the general geography and getation of the valley region is followed by an notated list of the flora, which includes at least 90 w species. The vegetation falls naturally into 4 jor divisions: (1) thorn forest, (2) short-tree forest, Oak forest, and (4) Pine forest. A 'habitat table' . 42–8) lists, in order of abundance, the characteristic nts to be found on the beach, the coastal plain, the sa, the arroyo margin, the streamways, the canyon ttoms, the canyon and mountain slopes, the cliffs, hilltops and ridges, and the swamps.

.19.1 (75.2) : 12.25–8. HOWE, H. **Our common es: how to know and use them.** Natural History ciety of Maryland. 1942. pp. 98 + plates.

The purpose of this publication is to give the general der descriptions of the more common trees of ltimore, with indications of their growing con-ions and uses. A short section on tree culture is cluded, and there is an index to both co.nmon and tanical names.

19.1 (75.5) : 12.25–8. FOSBERG, F. R., and WALKER, H. **First supplement to a preliminary check list of nts in the Shenandoah National Park.** *Castanea* 8, 43 (109–15).

This supplement contains two important lists of ditions to the original preliminary check list pub-hed in *Castanea* 6, 1941 (89–136). The new additions clude the following trees: *Pinus echinata* Mill., *nulus canescens* (Ait.) Sm. (an exotic), *Carya tomen-sa* Nutt., *Corylus americana* Walt., *Quercus coccinea* uench., *Q. marilandica* (L.) Muench., *Q. stellata* ang, *Gleditsia triacanthos* L., *Gymnocladus dioica*). K. Koch, *Chionanthus virginica* L., *Aesculus pocastanum* L. (an exotic), *Euonymus americanus* L. d *Catalpa bignonioides* Walt. (an exotic).

12.19.1 (77.8). ERICKSON, R. O., BRENNER, L. G., and WRAIGHT, J. **Dolomitic glades of east-central Missouri.** *Ann. Mo. bot. Gdn.* 29, 1942 (89–101). H.S.B.

An account of the physical characteristics and vegetation of the outcrops of thin-bedded dolomite or dolomitic limestone which occur in the Ozark region of Missouri. The most characteristic flora is herbaceous, but small trees are often found surrounding gullies or ledges of rock. The most common tree species are *Juniperus virginiana*, *Quercus muhlenbergii*, *Q. stellata*, *Celtis pumila*, *C. pumila* var. *georgiana*, *Acer saccharum* var. *schneckii*, *Rhamnus caroliniana*, *Vitis lincecumii* var. *glauca*, *Cornus florida*, and *Bumelia lanuginosa*.

12.19.1 (82) : 12.25–8. DEVOTO, F. E., and ROTHKUGEL, M. Indice de la flora leñosa argentina. [**Index of the woody flora of Argentina.**] *Publ. misc. Minist. Agric. Argentina* No. 140, 1942. pp. 183. [Span.]

The main part of this index gives the indigenous woody flora of each of the three regions into which Argentina is divided for the purpose of this publication. Both common and scientific names are noted, and data are given for each species on area of distribution, maximum diameter and height observed, abundance, extent of exploitation, and commercial importance. In addition, a list is given of the names of the exotic trees that have been introduced to Argentina.

12.19.1 (86) : 12.26–8. WOODSON, R. E., and SCHERRY, R. W. **Contributions toward a flora of Panama. VI. Collections chiefly by H. von Wedel in Bocas del Toro.** *Ann. Mo. bot. Gdn.* 29, 1942 (317–79). [Washington Univ.] H.S.B.

The following trees are included among the species recorded in this paper:—*Pera aperta* Croizat, sp. nov. (Euphorbiaceae), *Lacunaria panamensis* (Standl.). Standl., comb. nov. (Quiinaceae), *Ceiba allenii* Wood-son, sp. nov. (Bombacaceae), *Theobroma asclepiadi-florum* Shery, sp. nov. (Sterculiaceae), and *Stemmadenia lagunae* Woodson, sp. nov. (Apocynaceae).

12.19.1–2 (82). PARODI, L. R. La vegetacion del departamento de San Martin en Corrientes (Argentina). [**The vegetation of the Department of San Martin in Corrientes (Argentina).**] *Repr.* from *Darwiniana* 6 (2), [1943?] (127–78 + plates). [Span.] A.P.B.

Notes on the forest vegetation are included.

12.19.2. *Forest Types*

12.19.2 (47.2) : 12.25. SMIRNOVA, A. D. **Tipy elovykh lesov kraynego severa Kirovskoy oblasti.** [**Types of Spruce forest in the extreme north of the Kirovsk region.**] *Bot. Zh. S.S.S.R.* 28, 1943 (171–80). [Russ.f.] C.G.B.

The *Piceeta hylocomiosa*, *P. herbosa*, *P. polytrichosa*, and *P. sphagnosa* of this region are discussed from an ecological point of view. They all form part of the typical taiga.

12.19.2 (47.6) : 12.26–8. TUMADZHANOV, I. I. **Buk i bukovye lesa v nagornom Dagestane.** [**Beech and Beech woods in the Dagestan highlands.**] *Trav. Inst. bot. Tbilissi* No. 7, 1939 (57–83). [Russ. georgian, e.]

The *Fagus orientalis* forests of this region are described.

12.19.2 (47.6). SOSNIN, L. I. **Nekotorye dannye o smenakh lesnoy rastitel'nosti zapadnogo Kavkaza.** [**Some data on changes in the forest vegetation of the western Caucasus.**] *Sovetsk. Bot.* No. 3, 1943 (15–9). [Russ.] O.B.D.

Note on formations of forest vegetation (partly *Castanetum*) found on abandoned agricultural land in the region of Chvezhipsa River.

12.19.2 (75.6) : 12.19.4. WILLIAMS, R. M., and OOSTING, H. J. **The vegetation of Pilot Mountain, North Carolina: a community analysis.** *Bull. Torrey bot. Cl.* 71, 1944 (23–45). [Duke University, Durham, N.C.] O.B.D.

In 1941 and 1942 a phytosociological survey was made of the vegetation of Pilot Mountain which rises above the northwestern Piedmont of North Carolina. The 158 sample areas were spaced altitudinally along 'transects' ascending nine slopes and eight ravines. The four major communities represented are (1) Chestnut Oak/Black Pine, (2) Chestnut Oak/heath, (3) Oak/Hickory, and (4) mixed forest. *Quercus montana* and *Pinus rigida* are the dominant species of the Chestnut Oak/Black Pine community which covers the western half of the mountain and the higher southern slopes. Associated with these two species are *Quercus marilandica, Oxydendron arboreum,* and *Nyssa sylvatica.* The Chestnut Oak/heath community occurs on the higher north- and east-facing slopes and may be regarded as a Chestnut Oak subclimax brought about by repeated fires. The Oak/Hickory forest is the climax community of the ravines and the middle slopes of the eastern half of the mountain. *Quercus montana, Q. borealis* var. *maxima, Q. alba, Carya* spp., *Robinia pseudoacacia,* and *Liriodendron tulipifera* are important constituents of this forest. The mixed forest at the base of the eastern half of the mountain is a late successional community which is rapidly approaching the Oak/Hickory climax. The main tree species represented in this community are *Quercus montana, Pinus virginiana, Q. alba, Q. velutina, Robinia pseudoacacia, Nyssa sylvatica, Oxydendron arboreum,* and *Q. marilandica.*

12.19.2–3 (67.2). FAIRBAIRN, W. A. **Classification and description of the vegetation types of the Niger Colony, French West Africa.** *Pap. Imp. For. Inst.* No. 23, 1943. pp. 38 + plates + map.

Modifying the classification used in a previous paper [cf. *For. Abstr.* 2 (25)] the author groups vegetation types of the Northern Sudan, Sahelien and Saharan area in three main divisions and six formation-types in which are placed sixteen formations with five subformations and several associations as follows:—

A. *Edaphic moist woodland.*

I. *Tropical riparian woodland*: (1) Riparian woodland* and (1a) Thorn thickets therein; (2) Riparian thornland.*

II. *Tropical swamp woodland*: (3) Swamp woodland* and (3a) Thorn thickets therein; (4) Swamp thornland.

B. *Climatic dry woodland.*

III. *Tropical savanna woodland*: (5) Woodland savanna; (6) Orchard woodland savanna* with (6a) Inselberg vegetation; (7) Scrub savanna with (7a) Hill scrub savanna and (7b) Combretaceous scrub; (8) Dry palm-stands.

IV. *Tropical thornland*: (9) Thorn forest*; (10) Thorn savanna*; (11) Thorn scrub.

V. *Tropical grassland*: (12) Savanna*; (13) Grass steppe; (14) Marsh grassland.

C. *Desert.*

VI. *Tropical desert*: (15) Semi-desert; (16) True desert.

* These are illustrated.

The descriptions are based on records of the vegetation types made mile by mile along the author's 700 mile route in the Niger Colony (map); over 100 species of plants are listed. It is noted that the true *Acacia seyal* Del. occurs in several formations and has been confused by other authors with *A. tortilis, A. stenocarpa* and *A. raddiana.* The descriptive account is prefaced by notes on geology, soil, climate and population, factors which have contributed to form a biotic climax in the south while the climatic climax remains further north.

12.19.3. *Other Vegetation Types*

12.19.3 (77.2–3 : 77.5–8) : 12.19.4. MCCOMB, A. L., and LOOMIS, W. E. **Subclimax prairie.** *Bull. Torrey bot. Cl.* 71, 1944 (46–76). [Iowa State College, Ames, Iowa.] O.B.D.

A discussion on the causes for the formation and persistence of the prairie peninsula of Iowa, Minnesota, Wisconsin, Missouri, Illinois and Indiana. The prevalence of prairie in this area is thought to be due mainly to the character of the soils and the topography of the glacial till plains. The high lime content of the Poerian loess and Wisconsin till stimulates the growth of grasses at the expense of tree seedlings, while on the leached but undissected plains of the Kansan and Illinoian glaciations the development of planosols with impervious, poorly drained and poorly aerated soils has rendered the establishment of trees difficult. Such areas are invaded only very slowly, even by xerophytic forest species, and their transformation to the true Oak/Hickory climax of the region from the present semi-permanent edaphic prairie climax will probably depend largely on improved drainage and the formation of new and less mature soil profiles as a result of erosion.

12.2. *Special [Systematic] Botany*

12.2 (469). ROTHMALER, W. Árvores de Portugal. [**Trees of Portugal.**] *Bol. Soc. Broteriana* 15 (2ª ser.), 1941 (133–48). [Port.]

Notes on the taxonomy and nomenclature of a number of species, notably *Pinus* and *Quercus* spp.

12.2 (86). DUGAND, A. Noticias botánicas colombianas. II. Especies nuevas y criticas. [**Colombian botanical notes. II. New and critical species.**] *Caldasia* 2 (8), 1943 (285–99). *Abstr.* in *Trop. Woods* No. 77, 1944 (41).

Notes on species of Palmaceae, Meliaceae, Euphorbiaceae, and Apocynaceae. *Orbigyna cuatrecasana, Trichilia lamelulata,* and *Pseudobombax subandinum* are described as new. *Peschiera cymosa* (Jacq.) Dugand is a new combination (= *Tabernaemontana cymosa* Jacq. = *T. psychotrifolia* H. B. K.)

12.21. Fungi

12.21 : 44.3 : 12.25–8. BLACKWELL, E. **The life history of *Phytophthora cactorum* (Leb. and Cohn) Schroet.** *Trans. Brit. mycol. Soc.* 26 (1 & 2), 1943 (71–89). [Royal Holloway College.] L.S.

An account is given of the life history of the paragynous, homothallic fungus, *Phytophthora cactorum,* including the development of both mycelium and reproductive organs, and the germination of the oospore. Strains of this fungus are believed to be responsible for a variety of diseases (e.g. crown rot, root rot, die-back, damping-off) among widely different genera, including ***Acer, Pyrus, Fagus*** and ***Pinus.***

..21 : 44.3. ELLIOTT, C. **Recent developments in the assification of bacterial plant pathogens.** *Bot. Rev.* 9, 43 (655–66). [U.S. Bureau of Plant Industry.]

..21 : 44.3 : 12.25–8. GREENE, H. C. **Notes on isconsin parasitic fungi. II.** *Trans. Wis. Acad. Sci. rts Lett.* 34, 1942 (83–98). [Univ. of Wisconsin.] .U.

Among the fungi recorded are *Microsphaera alni* var. *tensa* and *Phyllactinia corylea* on *Quercus rubra*, *loeosporium septorioides* on *Quercus ellipsoidalis*, *Unula salicis* on *Salix rostrata*, *Septoria salicina* on *Salix agilis*, *Dothidella betulina* on *Betula pumila* var. *andulifera*, *Phomopsis juniperovera* (?) and *Pestalotia nerea* on *Juniperus virginiana*, and *Septoria populi* on *opulus nigra*.

..21 : 44.3 : 12.25. LINDER, D. H. **New species of haeropsidales and Melanconiales.** *Mycologia* 35 (5), 43 (495–502). R.A.M. 23 (81).

Descriptions are given of 5 new species of haeropsidales and Melanconiales, including *Dothiora pinastri*, *Cryptosporium pinicola*, and *C. lunasporum*, three on living blister rust cankers of *Pinus monticola* Idaho. A key indicates the differences between the ecies of *Cryptosporium* occurring on conifers in North nerica.

..21 : 44.3 : 12.25. OLIVE, L. S. **Morphology, cytogy and parasitism of *Thekopsora hydrangeae*.** *J. sha Mitchell sci. Soc.* 59, 1943 (45–67 + plates). L.S.

The heteroecious rust fungus, *Thekopsora hydrangeae* agn., is known to occur on *Tsuga canadensis* and on veral species of *Hydrangea* in North Carolina, diana, Pennsylvania, Tennessee, and West Virginia. e pycnia occur in the spring on both surfaces of the ves of *Tsuga canadensis*, but are found more comnly on the lower surface. The present paper gives account of the morphology, cytology, development, st-parasite relationships and life history of this ngus.

21 : 44.3. WAKSMAN, S. A., and BUGIE, E. **Action antibiotic substances upon *Ceratostomella ulmi*.** *c. Soc. exp. Biol. Med.* 54 (1), 1943 (79–82). [New sey Agricultural Exp. Sta., New Brunswick, N.J.] S.

A study was made of the fungistatic and fungicidal ion of various antibiotic substances upon *Ceratomella ulmi*, the causative agent of the Dutch Elm ease. Actinomycin and clavacin had a strong ngistatic and fungicidal effect, penicillin and streptoicin had no effect at all, while fumigacin, hemicyanin and gliotoxin gave intermediate results. e addition of certain nutrients (especially peptone) the medium markedly reduced the antifungal activi of actinomycin and clavacin.

21 (73) : 12.25 : 44.3. BOYCE, J. S. **Host relationps and distribution of conifer rusts in the United ites and Canada.** *Trans. Conn. Acad. Arts Sci.* 35, 3 (329–482). [Yale Univ.]

A comprehensive list of rust fungi pathogenetic to iferous trees in the United States and Canada, uding species of 15 genera. The hosts and range of h species are indicated, and remarks are added on particular features of interest or importance. The era dealt with are *Caeoma*, *Calyptospora*, *Chrysota*, *Coleosporium*, *Cronartium*, *Gymnosporangium*, *lopsora*, *Melampsora*, *Melampsorella*, *Melampsoridm*, *Milesia*, *Peridermium*, *Pucciniastrum*, *Uraecium* and *Uredinopsis*. Indexes to (1) pycnial and aecial hosts, (2) uredial and telial hosts, and (3) the rusts, are provided, and there are 558 references.

12.25. Gymnosperms

12.25. JONES, G. N. **The botanical name of the Giant Sequoia.** *Science* 98 (*n.s.*), 1943 (406–7). [Univ. of Illinois.] L.S.

Since the two species of *Sequoia*, generally known as *S. gigantea* and *S. sempervirens*, differ essentially in almost every phase of their life history, and since no such extreme differences between species exist in any other genus of conifers, the author suggests that the generic name *Sequoia* should be replaced by that of *Sequoiadendron* in the case of the first-named tree. The commonly-used name, *Sequoia gigantea*, is a homonym and therefore is untenable under the international rules of nomenclature.

12.25. MOSELEY, M. F. **Contribution to the life history, morphology, and phylogeny of *Widdringtonia cupressoides*.** *Lloydia* 6 (2), 1943 (109–32). *Abstr.* in *Trop. Woods* No. 76, 1943 (54).

The Callitroideae, containing the genera *Actinostrobus*, *Callitris*, and *Widdringtonia*, are regarded as a natural group which should be established as a distinct subfamily of the Cupressaceae. This group is believed to be the highest evolved of the subfamilies of the Cupressaceae, whereas the Cupressoideae and the Juniperoideae are considered to be the least evolved. The Thujoideae occupy an intermediate position between these groups, with *Thuja* as the highest evolved member of the subfamily. *From author's summary.*

12.25 (76.1) : 21.3 : 12.19.1. HARPER, R. M. **Hemlock in the Tennessee Valley of Alabama.** *Castanea* 8, 1943 (115–23).

The author discusses the distribution of *Tsuga canadensis* in Alabama and gives a list of other plant species (in order of abundance) which were found during his visits to Fox-trap Creek. Short notes are given on a few selected species, including *Juglans cinerea*.

12.26–8. Dicotyledons

12.26–8 : 21 : 23–4 : 33.38. Breves informações sobre a *Piptadenia communis* ('Jacaré'). **[Brief notes on *Piptadenia communis* ('Jacaré').]** *Bol. Minist. Agric. Brazil* 31 (12), 1942 (47–54). [Port.]

Notes are given on the botanical characters, site requirements, cultivation, and uses of this species. The wood yields excellent charcoal.

12.26–8 : 01.2. ADAMSON, R. S., ESTERHUYSEN, E., and PHILLIPS, E. P. **Some changes in nomenclature, IV.** *J. S. Afr. Bot.* 9, 1943 (137–40). C.G.B.

The author recommends that the genus *Buxus* should include only those species in which the anthers are supported by filaments and in which a rudimentary pistil is present in the male flower, while species which have sessile anthers and no rudimentary pistil should be placed in the genus *Notobuxus* irrespective of the number of anthers. The separation of the two genera on this basis necessitates the substitution of the name *Notobuxus* for that of *Buxus* in the following species:— ***N. acuminata*, *N. banguellensis*, *N. macowani*, *N. madagascarica*, *N. natalensis*, *N. nyasica*,** and ***N. obtusifolius*.**

12.26–8 : 31.1. BAILEY, I. W. **The comparative morphology of the Winteraceae. III. Wood.** *J. Arnold Arbor.* 25, 1944 (97–103 + plates).

Members of the Winteraceae (excluding *Illicium*) are among the few living representatives of the Dicotyledons which have a primitive, vesselless type of secondary xylem. The cambium is of the same cytological and histological type as that which occurs characteristically in lower vascular plants which form secondary xylem of this type. The wood parenchyma, tracheids and rays vary considerably among the different species.

The morphological characters of the wood are compared with those of certain other types of wood, and particularly with *Trochodendron* and *Tetracentron*, which also possess a vesselless type of secondary xylem.

12.26–8 : 44.3 : 12.11.3. CLAPPER, R. B., and GRAVATT, G. F. **The American Chestnut: its past, present and future.** *Sth. Lumberm.* 167 (2105), 1943 (227–9). [U.S. Bureau of Plant Industry.]

Following the killing of practically all the indigenous Chestnuts (*Castanea dentata*) in the eastern United States by the blight, *Endothia parasitica*, test plantations of the blight-resistant Asiatic species *C. crenata* and *C. mollissima* have been established with varying success, and breeding experiments have been undertaken in an attempt to obtain a disease-resistant hybrid having the American species as one of the parents.

12.26–8. COKER, W. C. ***Magnolia cordata* Michaux.** *J. Elisha Mitchell sci. Soc.* 59, 1943 (81–8 + plates). [Univ. of North Carolina, Chapel Hill, N.C.] L.S.

The author discusses authentic records of the range of *Magnolia cordata* Michaux in the United States, and includes a map showing the locations of all specimens of this tree examined or believed to be authentic. *M. cordata* appears to differ from *M. acuminata* var. *aurea* only in the generally smaller size of the tree, the pubescent twigs of the first, and usually second, years, the somewhat more consistently smaller and more broadly ovate leaves, and in geographical range, *M. cordata* being confined mainly to lower altitudes. The specimens examined have proved to be a very variable group. The tree found in the lower Piedmont is considered to be no more than a variety of *M. acuminata*; a botanical description of this variety (*M. acuminata* var. *cordata* Sarg.) is given.

12.26–8. CRONQUIST, A. **Studies in the Simaroubaceae, I. The genus *Castela*.** *J. Arnold Arbor.* 25, 1944 (122–8).

This is the first of a series in which the author intends to revise the New World representatives of the Simaroubaceae. It presents 12 species and 2 varieties of the genus *Castela*.

12.26–8. DUGAND, A. Notas criticas sobre *Ficus pallida* Vahl y *Ficus prinoides* H. & B. ex Willd. [**Critical notes on *Ficus pallida* Vahl and *Ficus prinoides* H. & B. ex Willd.**] *Caldasia* 2 (7), 1943 (149–52). [Span.] *Abstr.* in *Trop. Woods* No. 76, 1943 (51).

These two closely related species of *Ficus* are described and differentiated and the various collections cited.

12.26–8. FLODERUS, B. **The continental *Salix glauca* species.** *Svensk bot. Tidskr.* 37, 1943 (169–72). [E.] L.S.

Botanical descriptions and synonymy are given for *Salix glaucosericea* Floderus, nom. nov., *S. glaucosericea* Flod. × *nigricans* Sm., hybr. nov., and *S. glaucosericea* Flod. × *retusa*, nom. nov.

12.26–8. FLODERUS, B. **A strange Scottish form of *Salix lapponum* L.** *Svensk bot. Tidskr.* 37, 1943 (173–4). [E.] L.S.

A description is given of the shrub *Salix lapponum* L. f. *boydii* (Lint.) Flod. [Synonym: *S. lapponum* × *reticulata* (*S. boydii* pro synon.) E. F. Linton.] The shape of the leaves is reminiscent of *S. reticulata* L., but the Scottish shrub does not exhibit any organic characters which would indicate a hybridizing strain of this species. Similar but perhaps less pronounced atypical forms of *S. lapponum* may be found in western Norway.

12.26–8 : 21 : 23 : 4 : 33.0. PRASAD, J. **The silviculture of *Cassia siamea*.** *Indian For.* 70, 1944 (5–11 + plate). [Forest Research Institute, Dehra Dun.]

The author outlines the many advantages and uses of *Cassia siamea* as a plantation crop and indicates the types of locality in which it is grown in different parts of the world. Sections are included on natural and artificial regeneration and on the capacity of the tree to withstand fire, wind, drought, and attack by insects and fungi. The species seems particularly suitable for quick-growing fuel plantations.

12.26–8 : 21 : 12.19 : 23.23.19 : 31 : 33.0 : 45. SHARMA, Y. M. L. **A note on the silviculture of *Chlorophora excelsa*.** *Indian For.* 70, 1944 (80–3 + plates). [Mysore Forest Service.]

Muvule (*Chorophora excelsa*) has recently been introduced into various parts of India (including the Presidencies of Bengal, Madras and Bombay) and the Andaman Islands. Experimental plantings in southern India are said to be giving good results.

The present paper gives a general description of the appearance and natural habitat of the tree and discusses its silvicultural characters, the germination capacity of the seed, natural and artificial regeneration, and the properties and uses of the timber.

Germination tests at Dehra Dun gave very poor results (probably owing to frost), but a high percentage of germination was obtained in Madras. Young seedlings, saplings and poles often suffer severely from browsing and from attack by a gall-forming insect, *Phytolyma lata*. The timber is teredo-proof and highly resistant to fungi.

12.26–8 : 21.6 : 56 : 31.2 : 98.1. STEARNS, J. L. **Balsa, its growth characteristics and uses.** *Sth. Lumberm.* 167 (2105), 1943 (216–20).

12.26–8 (410) : 21.0. HOWARD, A. L. **The Sycamore tree.** *Nature, Lond.* 153, 1944 (348–9).

A general discussion on the Sycamore (*Acer pseudoplatanus*) and the Common or Field Maple (*Acer campestre*). In the opinion of the author, both the botanical and vernacular names of the first-named species are inaccurate and misleading since the tree is by no means a spurious form of *Platanus*, and bears no relation whatever to the true Sycamore. The application of the epithet 'Common' in the case of the second species is also said to be inappropriate, since *Acer campestre* is by no means common in any sense of the term.

The author cites some historical references to the trees under discussion and draws attention to the desirable properties and uses of their timbers.

12.26–8 (410). HOWARD, A. L. **The Oak tree.** *Nature, Lond.* 153, 1944 (438–41).

A general discussion on Oaks in Britain, including historical records of the genus generally and of particularly fine individual trees. Special emphasis is laid on the need for the conservation and planting of Oaks in Britain at the present time. The species *Quercus pedunculata, Q. sessiliflora, Q. cerris* and *Q. lucombeana* are considered and appraised separately.

12.26–8 (47.6). DOLUKHANOV, A. K poznaniyu kavkazskikh beréz sektsii *albae*. [**Contribution to knowledge of Caucasian Birches of the *alba* group.**] *Not. system. geogr. Inst. bot. Tiphlis.* No. 7, 1939 (3–19). [Russ. georgian.]

This paper includes a description of *Betula litwinowii* A. Doluch., sp. n., and of its varieties var. *svanica* A. Doluch., var. n., and var. *abchasia* A. Doluch., var. n.

12.26–8 (47.6). KUTATELADZE, SH. Novÿ vid roda *Pyrus* L. iz vostechnoy gruzii. [**A new species of *Pyrus* from eastern Georgia.**] *Not. system. geogr. Inst. bot. Tiphlis.* No. 8, 1939 (11–21). [Russ. georgian.]

P. georgica Kuthatheladze, sp. n., *P. georgica* var. *glabra* Kuth., var. n., and *P. salicifolia* Pall. var. *angustifolia* Kuth., var. n., are described.

12.26–8 (69). CROIZAT, L. **New Euphorbiaceae from the Island of Mauritius.** *Trop. Woods* No. 77, 1944 (13–8). [Arnold Arboretum, Harvard Univ.]

Three new species are recorded and described. These include *Claoxylon brachyphyllum* Croizat, sp. nov., a tree or shrub found near Forest Station at Petrin, and *Cleidion* (?) *cafcaf* Croizat, sp. nov., a tree commonly found in the upland climax forest above the Black River.

12.26–8 (73). CLARK, R. B. **A revision of the genus *Bumelia* in the United States.** *Ann. Mo. bot. Gdn.* 29, 1942 (155–82). H.S.B.

The genus *Bumelia*, unlike other members of the Sapotaceae, is adapted for growth in a temperate climate. The present paper deals with the general morphology and taxonomy of the genus and with its geographical distribution in the United States. Of the 35 to 40 known species of *Bumelia*, 14 occur in the United States. These are *B. lanuginosa* (vars. *albicans* and *oblongifolia*), *B. rigida*, *B. lacuum*, *B. rufotomentosa*, *B. tenax* (?), *B. anomala*, *B. rufa*, *B. lycioides* (also *B. lycioides* vars. *virginiana* and *ellipsoidalis*), *B. smallii*, *B. reclinata*, *B. cassinifolia*, *B. texana*, *B. megacocca*, and *B. angustifolia*. Each species or variety is described separately and lists are given showing the source of all the specimens examined. The names of doubtful or excluded species are appended.

12.26–8 (76.4 : 78.9 : 79.1) : 12.19 : 21 : 31.0. BLISS, E. S. **Southwestern Oak trees.** *J. For.* 42, 1944 (55–7). [Southwestern Forest and Range Exp. Sta.]

Only two of the Oak trees in the southwestern States are common over large areas, the Arizona White Oak (*Quercus arizonica*) and Emory Oak (*Q. emoryi*). These trees are found in southern Arizona, New Mexico and northern Mexico, and the latter species also occurs in western Texas. Their site requirements, wood qualities and growth characteristics are noted briefly.

12.26–8 (76.6). LITTLE, E. L. **American Smoketree, (*Cotinus obovatus* Raf.), one of Oklahoma's rarest tree species.** *Proc. Okla. Acad. Sci.* 23, 1943 (21–3). L.S.

The rare species, *Cotinus obovatus* Raf., a shrub or small tree first found in Oklahoma in 1819 by Nuttal and more usually referred to as *Cotinus americanus* Nutt., has since been discovered in a few other isolated localities in Arkansas, the Ozark region of Missouri, eastern Tennessee, northern Alabama, and western Texas. Its rarity, discontinuous distribution, and lack of related species in the New World suggest that the species was formerly of general distribution but is now approaching extinction.

12.26–8 (81). CROIZAT, L. **New or critical Euphorbiaceae of Brazil.** *Trop. Woods* No. 76, 1943 (11–4). [Arnold Arboretum, Harvard Univ.]

Notes on the genus *Jatropha* L., and the species *J. froesii* nom. nov. (*J. pubescens* Pax), together with a description of *Algernonia pardina* Croizat, sp. nov. The latter is a tree up to 20 m. in height reported to be found in Brazil, Bahia, Municipio do Itambé, Agua Bela, and the basin of the Rio Pardo. Nothing is known of its possible economic value.

12.26–8 (81). DUCKE, A. **New forest trees and climbers of the Brazilian Amazon.** *Trop. Woods* No. 76, 1943 (15–32).

The trees and climbers described or mentioned in this paper represent a fourth series of botanical novelties collected by the author in the Brazilian State of Amazonas [cf. *Trop Woods* No. 31, 1932 (10–29); No. 43, 1935 (19–23); and No. 50, 1937 (33–40)]. New tree species described include *Ampelocera latifolia* Ducke (Ulmaceae), *Guarea carinata* Ducke (Meliaceae), *Vochysia urubuensis* Ducke (Vochysiaceae), *Caryodendron amazonicum* Ducke (Euphorbiaceae), *Dendrobangia multinervia* Ducke (Icacinaceae), *Quararibea spatulata* Ducke (Bombacaceae), *Sloanea brachytepala* Ducke (Elaeocarpaceae), *Mouriria densifoliata* Ducke (Melastomaceae), and *Calocarpum odoratum* Ducke (Sapotaceae).

12.26–8 (81) : 23.2–4 : 21.0 : 31.0 : 34.2 : 12.11.3 : 56.01–02. NAVARRO DE ANDRADE, E. O Eucalipto. [**The Eucalypt.**] Chacaras e Quintais, Rua Assembléa, 54, S. Paulo. 1939. pp. 121 + (2). [Port.]

A very comprehensive monograph on Eucalypts and their timber, with special reference to Brazilian experience. The monograph deals with the various aspects of the silviculture, management, and utilization of Eucalypts, and with the properties and uses of their timber and of the minor products they yield. One section of the monograph gives numerous data obtained in Brazil on the diameter and height growth of many species.

12.26–8 (82). O'DONNELL, C. A., and LOURTEIG, A. **Hippomaneae argentinae (Euphorbiaceae).** *Lilloa, Tucumán* 8 (2), 1943 (545–91 + plates). *Abstr.* in *Trop. Woods* No. 76, 1943 (52).

A systematic study of all the Argentine species of *Actinostemon, Colliguaya, Sapium, Sebastiania*, and *Stillingia*. *Sapium haematospermum* Muell. Arg., var. *saltensis* is described as new. Four species are recorded for the first time as occurring in Argentina.

12.26–8 (85). MACBRIDE, J. F. **Flora of Peru.** *Bot. Ser. Field Mus., Chicago* 13 (3), 1943 (1–507). *Abstr.* in *Trop. Woods* No. 77, 1944 (43).

Contains descriptions of all the known Peruvian species of 73 genera of Leguminosae and one species of *Krameria*. There are diagnoses of new species in *Acacia* (3), *Adesmia, Astragalus, Bauhinia* (4), *Brownea*

(2), *Calliandra* (2), *Canavalia*, *Cassia* (5), *Centrosema*, *Coumarouna*, *Dalbergia*, *Dalea* (2), *Derris*, *Diplotropis*, *Galactea* (2), *Inga* (8), *Lecointea* (2), *Lupinus* (2), *Machaerium* (2), *Macrolobium*, *Mimosa*, *Ormosia*, *Ormosiopsis*, *Piptadenia*, *Pithecolobium* (2), *Sclerolobium*, *Stylosanthes*, and *Swartzia*. There are also several new varieties and numerous new combinations, ten of the latter resulting from transfers from *Lonchocarpus* to *Derris*.

12.26–8 (86). CROIZAT, L. Euphorbiaceae Cactaceaeque novae vel criticae colombianae. [New or critical Euphorbiaceae and Cactaceae of Colombia.] *Caldasia* 2 (7), 1943 (123–39 + plate). *Abstr.* in *Trop. Woods* No. 76, 1943 (51).

The purpose of these and subsequent notes is to describe and discuss new or critical forms in the Euphorbiaceae and the Cactaceae of Colombia as they become known. A new genus, *Phyllanoa* (related to *Savia*) is represented by the single species, *P. colombiana* Croizat, a euphorbiaceous tree about 25 ft. tall growing at elevations of 6,000–7,500 ft. in El Valle near the summit of Cordillera Occidental. New species are described in *Croton* (3), *Alchornea* (1), *Euphorbia* (1), and *Sapium* (1). There are also accounts of species of *Sapium*, *Pedilanthus*, *Opuntia*, *Acanthocereus*, and *Farilea*.

12.26–8 (86). CUATRECASAS, J. Notes a la flora de Colombia. [Notes on the flora of Colombia.] *Rev. Acad. Col. Cienc. exact. fis. nat.* (*Bogotá*) 4 (15/16), 1941 (337–48). [Span.] *Abstr.* in *Trop. Woods* No. 76, 1943 (50).

These notes contain descriptions of 18 new species in the following genera:—*Espeletia* (3), *Brunellia* (4), *Polylepis* (2), *Valeriana* (1), *Paullinia* (6), *Sida* (1), and *Biophytum* (1). The species of *Brunellia* and *Polylepis* are small to medium-sized trees growing at elevations of 7,000–11,000 ft. above sea-level.

12.26–8 (86). DUGAND, A. Nuevas nociones sobre el genero *Ficus* en Colombia. [New points on the genus *Ficus* in Colombia.] *Caldasia* 2 (8), 1943 (265–83). *Abstr.* in *Trop. Woods* No. 77, 1944 (41).

An account of 28 Colombian species of *Ficus*, of which three are new.

12.26–8 (86). DUGAND, A. ***Machaerium capote*** **Triana.** *Caldasia* 2 (7), 1943 (159–64 + plate). *Abstr.* in *Trop. Woods* No. 76, 1943 (52).

This is a small to rather large Colombian tree known as Capote (Cundinamarca, Tolima, and Huila), Sietecueros (Atlántico and northern Bolivar), and Sietecascas (other parts of Bolivar). The paper gives a Latin diagnosis together with an account of the occurrence of the species.

12.26–8 (86). MONACHINO, J. **A Colombian species of *Sterigmapetalum*.** *Trop. Woods* No. 77, 1944 (10–2).

A description is given of *Sterigmapetalum colombianum* Monachino, sp. nov., a dioecious tree about 25 m. high and 30–60 cm. in diameter belonging to the family Rhizophoraceae. It is found growing on high lands in the Sierra Nevada.

12.26–8 (86). URIBE-URIBE, L. Nuevas especies colombianas del genero *Inga*. [New Colombian species of genus *Inga*.] *Caldasia* 2 (8), 1943 (241–50). *Abstr.* in *Trop. Woods* No. 77, 1944 (41).

Four new Colombian species of *Inga* are described. One of them, *I. coragypsea* L. Uribe, known in Santander del Sur as Guamo Gallinazo, is noted for the disagreeable odour of its leaves and branches.

12.26–8 (86 : 87). DUGAND, A. El genero monotipico *Stuebelia* en Colombia y Venezuela. [The monotypic genus *Stuebelia* in Colombia and Venezuela.] *Caldasia* 2 (7), 1943 (153–7 + plates). [Span.] *Abstr.* in *Trop. Woods* No. 76, 1943 (51–2).

A detailed and illustrated account of *Stuebelia nemorosa* (Jacq.) Dugand, a small capparidaceous tree of northern Colombia and Venezuela. The vernacular names in Atlántico and Bolivar, Colombia, are Calabacito, Calabasuero, Calabazuelo, and Cojón de Burro.

12.26–8 (95). SMITH, A. C. **Studies of Papuasian plants, VI.** *J. Arnold Arbor.* 25, 1944 (104–21).

The following new tree species are included in the present list:—*Sericolea decandra* (2–4 m.), *S. venusta* (about 10 m.), *S. brassii* (5–7 m.), *S. lanata* (7 m.), *Aceratium erythrocarpum* (up to 25 m.), *A. sericeum* (up to 23 m.), *A. brassii* (up to 20 m.), *A. gracile* (up to 15 m.), *A. angustifolium* (shrub or small tree), *A. clemensiae* (shrub or small tree), *A. dasyphyllum* (tree), *A. insulare* (8–20 m.), and *A. archboldianum* (up to 10 m. or possibly higher).

13.2. *Special* [*Systematic*] *Zoology*

13.2 : 45.3 : 12.25. BROWN, A. W. A., and MACKAY, M. R. **The Jack Pine budworm and the Spruce budworm, *Cacoecia fumiferana* Clem. (Tortricidae).** *Canad. Ent.* 75, 1943 (207–11). I.I.E.

This paper brings together 'some morphological, biological, and distributional data which, in the opinion of the authors, constitute additional evidence in support of the theory that the Jack Pine budworm should be considered as either specifically or subspecifically distinct from *Cacoecia fumiferana* Clem'.

13.2 : 13.14 : 45.3 : 12.25 : 12.26–8. MCGUFFIN, W. C. **New descriptions of larvae of forest insects. VII, *Pero*, *Nepytia*, *Caripeta* (Lepidoptera, Geometridae).** *Canad. Ent.* 75, 1943 (186–90). I.I.E.

The three species described are *Pero morrisonarius*, which feeds on White Spruce, Tamarack, Balsam and White Pine; *Nepytia canosaria*, which feeds on White, Black, Red and Englemann Spruce, Hemlock, Balsam, Tamarack, White Cedar, Douglas Fir, White, Red and Jack Pine, and White Birch; and *Caripeta divisata*, which feeds on White, Red, Black, Englemann and Sitka Spruce, Tamarack, Western Larch, Balsam, Western Hemlock, Alpine Fir and Douglas Fir.

13.2 (410). STOKOE, W. J. (Compiler) and STOVIN, G. H. T. (Editor). **The caterpillars of the British Butterflies, including the eggs, chrysalids and food-plants, based upon 'The butterflies of the British Isles' by Richard South, F.R.E.S.** Frederick Warne and Co., Ltd., London and New York. 1944. pp. 248. Price 10s. 6d. net.

13.2 (42.1–8). AIRY SHAW, H. K. **Some recent captures of scarce or local Coleoptera in Gloucestershire.** *Ent. mon. Mag.* 80, 1944 (80–2).

The records include *Elater ferrugatus* in decaying Elm, *Calambus bipustulatus* beaten from Oak, *Aulonium trisulcum* (dead) in a burrow of *Scolytus destructor* in the bark of *Ulmus procera*, *Prionychus ater* bred from pupa in an old Oak, and *Sphaeriestes gabrieli* beaten from Pine or Larch.

13.2 (42.1–8). ASHE, G. H. **Devonshire and Sussex Coleoptera in 1942–43.** *Ent. mon. Mag.* 80, 1944 (70).

A list of some of the beetle fauna of the district. Rotten logs from a sawmill produced *Quedius ventralis* Ahr. in all stages as well as larvae and pupae of *Prionocyphon serricornis* Müll., while *Enicmus brevicornis* Mannh., *Diplocoelus fagi* Guér. and *Laemophloeus monilus* F. were taken from a fallen Beech.

13.2 (42.1–8). RIGGALL, E. C. **Additions to the list of Lincolnshire Coleoptera.** *Ent. mon. Mag.* 80, 1944 (74–5).

Included in the present list are *Tetropium gabrieli* found beneath the bark of Larch stumps, *Balaninus glandium* on a small decayed stump, *Hylurgops palliatus* in decaying wood, *Laemophloeus duplicatus* beneath the bark of a tree, *Silvanus unidentatus* in decaying wood, *Glischrochilus olivieri* and *G. quadripunctatus* on moss and beneath the bark on tree stumps, and *Schapisoma boleti* under bark.

13.2 (71.3–4) : 45.3 : 12.26–8. ATWOOD, C. E. **A third tent caterpillar in eastern Canada (Lepidoptera, Lasiocampidae).** *Canad. Ent.* 75, 1943 (203–5). I.I.E.

An outline is given of the life history of *Malacosoma pluvialis* Dyar, the western tent caterpillar, which has recently been noted in certain districts of Ontario and Quebec. Its chief food plants are *Prunus pennsylvanica*, *Betula papyrifera*, and a small species of *Salix* which grows in association with these. Little is known of any insect predators, but the eggs and cocoons are subject to attack by small mammals such as mice and shrews.

13.2 (81) : 31.43 : 45.3 : 12.26–8. BONDAR, G. Notas entomológicas da Baía. XII. **[Entomological notes from Baía. XII.]** *Rev. Ent.* 14 (1/2), 1943 (85–134). R.A.E. 32A, 1944 (30).

Lyctus brunneus Steph. which had previously been reported only twice from Brazil is recorded from structural timber in the State of Espirito Santo, and brief notes are given from the literature on its morphology, bionomics and control. The larvae and pupae were attacked by an unidentified Hymenopterous parasite. Larvae and adults of *Phelypera pachirae*, Mshl., a weevil that was described from *Pachira insignis*, which is grown in Bahia as a shade tree and for its oleaginous seeds, were observed in 1943 defoliating *Pachira aquatica* in the streets of Bonfim.

13.2 (82). MONRÓS, F. Algunos coleópteros de interse forestal observados en la Isla Victoria (Gobernación del Neuquen). **[Some Coleoptera of forest interest observed in the Isle of Victoria (Governmental District of Neuquen).** *Rev. Fac. Agron. Vet., B. Aires* 10, 1943 (1944) (536–43). [Span.span.e.port.] A.P.B.

An annotated list of the xylophagus Coleoptera that have been observed by the author at the Victoria island in the National Park of Nahuel Húapi.

2. SILVICULTURE

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

21.2. *Moisture Requirements. Water régime*

21.2 : 12.26–8 (74) : 11.41.3. COLVIN, W. S., and EISENMENGER, W. S. **Relationships of natural vegetation to the water-holding capacity of the soils of New England.** *Soil Sci.* 55, 1943 (433–46). [Massachusetts Agricultural Exp. Sta.] O.R.E.

From a study made in New England on the relation between the natural vegetation and the water-holding capacity of the soil it appears that certain trees, shrubs and herbs grow in greatest abundance on soils of particular water-holding ranges, while the distribution of other species seems to be unaffected by this soil factor.

Pitch Pine, Black Oak and Scrub Oak are among the species which are generally most abundant on soils with a comparatively low water-holding capacity; Black Birch, Flowering Dogwood, Hickory, White Oak and Scarlet Oak occur mainly on soils with a medium water-holding capacity; Ash, Beech, Ironwood, Sugar Maple, Red Oak and Spruce prefer soils with a comparatively high water-holding capacity; while a considerable number of species, including Grey Birch, Hemlock, Red Maple, Red Cedar and White Pine, are found growing on soils varying widely in their moisture-retaining properties.

21.3. *Soil Requirements*

21.32 : 12.26–8 : 11.42.1. KRUPENIKOV, I. A. **Chloride dynamics in soils under *Betula kirghisorum* and some new data on its salt resistance.** *C.R. Acad. Sci. U.R.S.S.* 31, 1941 (488–90). [E.] Chem. Abstr. 37 (491). P.R.

The concentration of Cl in the soil solution was calculated and on this basis the osmotic pressure around the roots of the Birch (*B. kirghisorum*) was estimated at 35–40 atm. There were no other tree species on the site and it is concluded that this Birch is well adapted to very saline soils.

21.6. *Behaviour in the Stand*

21.6 : 12.25 (78.9 : 79.1) : 01.3. PEARSON, G. A. **Tree classifications.** *J. For.* 42, 1944 (49–51). [Southwestern Forest and Range Exp. Sta.]

A critical comparison of two systems of tree classification presented in papers by S. R. Gevorkiantz *et al* and F. P. Keen [cf. *For. Abstr.* 5 (108–9)], with particular reference to experience in the management of Ponderosa Pine in the southwestern States.

21.64 : 12.25 (77.4) : 45.3 : 13.2 : 42.23. GRAHAM, S. A. **Causes of Hemlock mortality in northern Michigan.** *Bull. Mich. Sch. For.* No. 10, 1943. pp. 61 + [1]. [Univ. of Michigan.]

Investigations on the Eastern Hemlock (*Tsuga canadensis*) in northern Michigan indicate that the Hemlock borer (*Melanophila fulvoguttata*) is a symptom rather than a cause of Hemlock decadence in this area, the real cause of decadence being unsuitable ecological conditions brought about mainly by cutting practices resulting in undue exposure of the residual trees. The frequency of borer infestation bears a direct relationship to the amount of unaccustomed exposure to which the tree is subjected. Inoculation experiments have shown that the Hemlock borer can live successfully only on trees that are dying. There is also a clear relationship between the rate of mortality and the amount of exposure and direction of exposure to sunlight, the greatest mortality occurring in trees exposed to the southwest. Trees with conical tops, wide crowns, or

long crowns appear to be less susceptible to injury than those having flat or rounded tops, or short or narrow crowns. Recommendations for selective cutting based on the results of this study are presented, particular attention being given to the effects of exposure.

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

22.1. *High Forest Forms*

22.14.1 : 12.25 (43.1–5). DANNECKER, K. Naturnahe Wirtschaft im Weisstannenwald. [**Management according to nature in Silver Fir forests.**] *Forstwiss. Cbl.* 64, 1942 (217–32, 246–53, 265–78). [G.]

A general discussion of selection management in Silver Fir stands with examples from small selection forests in the eastern Black Forest and in Swabia where Silver Fir is grown in mixture, generally with either Spruce or Spruce and Beech.

22.8. *Silvicultural Description of Forms of Stand*

22.89 (41.5) : 12.25–8 : 24.2 : 23.26. MCEVOY, T. **Report of the first annual excursion to the valley of the Suir, June 7th to 10th, 1943.** *Irish For.* 1 (1), 1943 (28–35).

The first annual excursion of the newly-formed Society of Irish Foresters was made in the neighbourhood of Clonmel. The following notes refer to areas visited during the excursion.

In the State forest of Carrick-on-Suir is a 55-year-old plantation consisting of blocks of pure Larch and Scots Pine (Scottish strain) on true conifer soil. This is now probably the best middle-aged conifer stand in the British Isles; heavy and almost annual thinnings since 1935 have yielded a gross income of £34 per acre and created a high expectation value. On richer soil (fern community type) Scots Pine is heavily branched, unlikely to make clean timber and will be replaced by Oak and Ash. Douglas Fir, Scots Pine and Larch planted 15 years ago on open Oak-scrub land have grown very unevenly.

In the adjoining State forest of Clonmel, plantations are primarily of Scots Pine and also of Sitka and Norway Spruces, European Larch, Douglas Fir and Japanese Larch. The first three species are used on ground cleaned of Oak scrub; *Tsuga heterophylla* and Beech are underplanted in belts, and groups of Oak are left for shelter and soil maintenance. Much of the area overlies Old Red Sandstone, with good conifer soil on the middle and lower slopes but having an impoverished soil on the higher levels where Scots Pine and Spruce make very little headway. While it is hoped to obtain better results by using *Pinus contorta* after more intensive soil preparation and drainage, it is doubtful if the financial results from these higher elevations will ever be good.

A nursery on Silurian shale was prepared by two methods:—(*a*) Skin-ploughing, removing the turf and re-ploughing before lining out conifers; (*b*) green cropping with oats, peas and vetches, nitro-chalk and kainit being applied to the soil. In two years 7 million usable transplants and 5½ million seedlings have been raised on 15½ acres.

22.89 (74.6) : 12.25 : 23.24 : 60.31.2. HAWLEY, R. C., and LUTZ, H. J. **Establishment, development and management of conifer plantations in the Eli Whitney Forest, New Haven, Connecticut.** *Bull. Yale Sch. For.* No. 53, 1943. pp. 81 + plates. [Yale Univ., New Haven.]

In southern Connecticut many fields that were formerly cultivated or pastured have been planted to conifers, principally White and Red Pines (*Pinus strobus* and *P. resinosa*) and Norway Spruce (*Picea abies*). On the Eli Whitney Forest, near New Haven, Connecticut, planting began about 1900, at first on an experimental scale but more extensively after 1909, and there are now about 2,800 acres of conifer plantations established on this area. The purpose of the present paper is to make available all useful information that has been obtained from these plantations in the course of their development from establishment to the present time.

Following a brief discussion of the climatic, physiographic, and economic factors controlling forest planting in this region, a detailed account is given of the establishment, development, management and protection of the plantations, of cultural operations and the harvesting of mature timber, and of the estimated costs and returns of growing planted White Pine and Norway Spruce. It is concluded that these two species can be grown successfully and profitably in southern Connecticut, and that conifers can be grown for at least one rotation, whether in pure or mixed stands, without adversely affecting the soil.

The text is well illustrated with twenty-five photographs.

23. FORMATION OF STANDS

23.1. *Natural Regeneration*

23.1 : 12.26–8 (54.2). DAVIS, D. **Sal natural regeneration in the United Provinces.** *Indian For.* 70, 1944 (1–5). [Working Plans Circle, U.P.]

Suggestions are made for operations to be carried out in Sal (*Shorea robusta*) regeneration areas (*a*) where patches of established poles and saplings exist, (*b*) where large whippy shoots or suppressed plants of Sal exist in sufficient quantities, and (*c*) where Sal regeneration is absent or deficient.

23.1 : 12.26–8 (68.9) : 43.3. NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1942.** Govt. Printer, Zomba. 1943. pp. 15.

Severe fires in the heavy growth of long grass that invaded areas where *Copaifera mopane* had been clear felled did much to inhibit regeneration of this species, whereas seedlings and coppice flourished on areas where only 50-per-cent. felling was allowed (p. 5).

23.1 : 12.26–8 (77.8). LIMING, F. G., and JOHNSTON, J. P. **Reproduction in Oak-Hickory forest stands of the Missouri Ozarks.** *J. For.* 42, 1944 (175–80). [Central States Forest Exp. Sta.]

As a result of past misuse the present productivity of these Oak/Hickory forests is far below the potential capacity of the land and the reproduction is largely of sprout origin, slow growing, poor in form, and composed largely of the less desirable species. It is concluded that improvement in stocking, growth and reproduction can be brought about by adequate protection from burning, grazing, and over-cutting.

23.13 : 12.25 (485) : 32.29 : 24.31 : 12.26–8. OLOFSSON, N. M. **Några erfarenheter från föryngringsarbetet å äldre, degenerade hyggestrakter i Övre Norrland. [Some experiences from regeneration work on old,**

degenerated felled areas in Upper Norrland.] *Svenska SkogsvFören. Tidskr.* 39, 1941 (243–78). [Sw.]

Investigations were made over a period of fifteen years on an area of 5,000 ha. of coniferous forest in Västerbotten that had been cut over some time previously and where natural regeneration was poor and the forest had degenerated. This was due in part to forest grazing, omission of certain measures of soil preparation, and to unsuitable methods of clearing the site. Worst conditions were found on an area that had been cut 25 to 50 years previously and where little attention had been given to the site thereafter. In this area it was necessary to clear all the remains of the old stand, to thin groups of young trees that became established in gaps, and to remove Birch trees and sprouts that hindered regeneration and were of no economic value. Experiments have shown that in this region the number of stump sprouts produced by Birch is at a minimum if the trees are girdled betwen 15th June and 15th July. Covering the stumps with sphagnum peat turfs, placed with soil side uppermost, was found to be effective in controlling regrowth after stump shoots had been cut back.

23.2. *Artificial Regeneration*

23.21. Choice of Species

23.21 : 12.25 : 21 : 23.24.2. McEvoy, T. **Observations on Corsican Pine in Glenmalure.** *Irish For.* 1 (1), 1943 (46–7).

On account of its more rapid growth, windfirmness, and comparative immunity from needle cast (*Lophodermium pinastri*) and attack by birds, Corsican Pine has distinct possibilities as an alternative to many other species, particularly Scots Pine, on types where exposure is great (fern-community, grass heath and *Calluna* heath). It is unsuitable for mixture by individuals with Scots Pine but mixes well with European Larch. A description is given of a difficult heather-*Mollinia* community in which Corsican Pine and *Pinus contorta murrayana* have done better than other conifers.

23.21 (932–9) : 12.26–8 : 21. Fiji. **Forest Department (Annual report for 1942).** *Council Paper* No. 19, 1943. pp. 5.

In this report brief notes are given on the growth characteristics and possible uses of the species *Albizzia falcata, A. lebbek, Ochroma limonensis, Eucalyptus* spp., *Swietenia macrophylla, Tectona grandis* and *Gmelina arborea*, which have been planted on an experimental scale in Fiji.

23.22. Preparatory Work. Auxiliary Measures

23.22.2 : 12.26–8 : 24.4 (47.6). Kucheryabÿkh, E. G. Ispol'zovanie mezhduryadi lesnÿkh polos pod s.-kh. kul'turÿ. [**The cultivation of agricultural crops between rows of trees.**] *Opÿt. Agron.* No. 2, 1941 (78–80). [Russ.] A.P.B.

The author carried out experiments on southern chernozems in the Nikolaev region with the cultivation of potatoes, beetroots, kidney-beans, maize, melons, etc., between rows, spaced 1·25 m. apart, of 1-year seedlings of *Quercus robur, Fraxinus excelsior, Gleditschia, Ptelea*, and *Caragana arborescens*. At the end of the first growing season no adverse effect due to the mixed cultivation was observed on either the survival or the height growth of the seedlings. These observations are confirmed by those of N. V. Shevchenko at the Mariupol Experiment Station, and it appears that agricultural cultivation is also admissible between rows of 2-year seedlings, provided they are widely spaced (at least 2 m. apart).

In the steppes of the Ukraine some 100,000 ha. have been covered with shelterbelts in the past 8–10 years, and eventually the belts are to occupy 3 per cent. of the land area of the Republic.

23.23. Sowings

23.23.1. *Seed Procurement, Treatment, and Testing*

23.23.1 (485) : 12.11.3. Langlet, O. Kvalitetsbetechning å skogsfrö. [**Designation of quality of seed of forest trees.**] *Skogen* 29, 1942 (315–8). [Sw.]

Measures to improve the hereditary constitution of Swedish forest trees include (1) breeding for yield combined with quality and (2) selection of mother trees in existing stands. The use of seed from such élite trees obviously necessitates some general scheme for designating its quality, which is dependent on provenance, condition, germination capacity, and the mother tree. The author discusses in detail proposed categories for, and method of using, a classification of this kind.

The role of progeny testing in determining quality is stressed and the significance of artificial pollination in the production of superior seed is pointed out, with an indication of the genetic basis of such methods of grading seed.

Price problems and the application of such a scheme of seed control are also briefly considered. M. L. C. W.

23.23.1 : 12.25 : 12.11.3. Wakeley, P. C. **Geographic source of Loblolly Pine seed.** *J. For.* 42, 1944 (23–32). [Southern Forest Exp. Sta., New Orleans, La.]

Seed of Loblolly Pine (*Pinus taeda*) from different sources in Louisiana, Texas, Georgia and Arkansas was planted in experimental plots in eastern Louisiana, each row of the plantation containing stock from a single source. The Louisiana source was approximately 50 miles from the planting site and nearly identical with it in latitude, elevation and climate. The other three sources were 350 to 450 miles from the planting site; while the Texas source was essentially similar, the Georgia and Arkansas sources differed considerably from the planting site in latitude, elevation and all climatic factors noted.

After 15 years in plantation the 4 lots of stock did not differ significantly in average survival, which ranged from 84·6 to 89·3 per cent. However, significant differences were observed in height, diameter at breast height, cubic-foot volume, cordwood volume and resistance to the rust *Cronartium fusiforme*, and these differences were associated with the sources of seed; the stock from the local (Louisiana) seed was significantly better than that from at least one, usually two, and in many cases all three of the other sources with reference to these factors.

Considering both growth and *Cronartium* infection, the greatest contrast was shown between the stock from Louisiana and that from Georgia. After 15 years in plantation the Louisiana stock averaged 32·1 ft. in height and 14·2 cords of wood per acre, and had 6·5 per cent. of all living trees infected on the trunk and 37·5 per cent. infected on trunk, crown or both. The Georgia stock averaged 26·1 ft. in height and 6·5 cords per acre, and had 32·1 per cent. of all living trees

infected on the trunk and 80·4 per cent. with general infection.

23.23.12 : 07.7. LINDQUIST, B., and NENZELL, G. Något om klättringsmetoder och klättringoredskap vid insamling av skogsfrö från stående träd. [**Some notes on climbing methods and equipment for use in the collection of forest seed from standing trees.**] *Repr.* from *Norrlands SkogsvFörb. Tidskr.* No. 2, 1943. pp. 26. [Sw.]

A series of tests were carried out by the authors with tree-climbing equipment, and an account is given of the advantages and disadvantages of each of the following methods for use in collecting seed from standing trees:—(1) climbing ropes, (2) climbing irons with stirrups, (3) climbing irons with spikes, (4) spikes driven into the tree, and (5) ladders.

While climbing ropes are relatively safe and easily transportable, their use is largely restricted to trees without branches, and repeated use on the same tree may cause injury. Climbing irons, both with stirrups and with spikes, were found to be relatively unsafe and both types may cause severe injury to the trees, particularly thin-barked varieties. The simplest, quickest and one of the safest methods of climbing trees, of those investigated, was the use of spikes driven into the tree. However, owing to damage caused to the quality of the timber, this method can be recommended only in exceptional cases.

Of the one-legged and two-legged ladders that were tested, that constructed of steel piping was outstanding. This ladder was used for heights up to 30 m. and was found to be the safest of all methods tested; it caused no appreciable damage to the trees. Its only disadvantage is that it is too heavy for carrying long distances in trackless forest. R. P. J.

23.23.13 : 12.26–8. STEVENSON, N. S. [**A method of removing the seeds from *Ochroma* floss.**] *Farm and Forest* 4, 1943 (199).

The seed pods are placed in shallow trays covered with chicken wire and opened in the sun. The seed is separated from the floss by placing the floss in a machine consisting of a ¼-in.-square mesh wire netting cylinder about 18 in. in diameter and 3 ft. long, through which runs a shaft carrying two opposite sets of ⅜-in.-square pegs spaced about 1¼ to 1½ in. apart and leaving a clearance of about 1 in. between the ends of the pegs and the netting. The shaft is mounted on bicycle wheel hubs and is rotated in a cylinder by hand power.

23.23.15 : 23.23.3 : 12.26–8. ROHMEDER, E. Keim und Saatversuche mit Sanddorn (*Hippophae rhamnoides* L.) [**Germination and sowing experiments with *Hippophae rhamnoides* L.**] *Forstwiss. Cbl.* 64, 1942 (242–5). [G.] [Univ. München.]

The cultivation of *H. rhamnoides* is now receiving attention in Germany on account of the high vitamin-C content of the berries. The tests described show *inter alia* that (1) the seed germinates much more readily when the fleshy portions of the berry are removed before sowing; (2) spring sowing is generally more successful than autumn sowing; (3) the seed can be stored during winter either in a dry condition at room temperature or, preferably, in moist sand at + 4–6° C.

23.23.19 : 12.25 : 23.23.15. ZACHARIEW, B. J. Über die Keimdauer bei Schwarzkiefersamen. [**On the length of the germination process of seed of Austrian Pine.**] *Forstwiss. Cbl.* 64, 1942 (278–85). [G.]

Tests carried out in Bulgaria showed that after 21 days in the germinator at 20–25° C. the germination percentage obtained was virtually equal to the maximum obtainable, and that it was unnecessary to extend tests over a longer period. Germination was hastened to a small extent by soaking the seed in water at room temperature.

23.23.19 (485) : 12.25 : 12.14.7 : 44.3 : 45.3. SYLVÉN, N. 1942 års granfrö i Syd- och Mellansverige. [**1942 Spruce seed in south and central Sweden.**] *Skogen* 30, 1943 (108–10). [Sw.]

Cf. *For. Abstr.* 5 (252). On the basis of weight and germination capacity it was found that the seed collected in 1942 from south and central Sweden was of low quality compared with that from Norrland and Dalarna. The quality of the cones was poor throughout and damage by insects was generally high. Spruce (*Picea abies*) cone rust (*Pucciniastrum padi*) was prevalent in many places, and yellow rust of the cones (*Chrysomyxa pyrolae*) occurred epidemically during the year (1942), particularly in the more northerly parts of central Sweden.

23.23.19 (82). AGUIAR, J. F. A. Essências florestais. Germinação de sementes. [**The germination of forest tree seeds.**] *Chacaras e Quintais* 68 (2), 1943 (169–71). [Port.] Biol. Abstr. 18 (5320).

The time required for the germination of seed of 72 Brazilian forest trees is given.

23.23.19 : 12.26–8 : 23.23.15 : 23.24.2. SHEAR, C. B., and CRANE, H. L. **Germination of the nuts of the Tung tree as affected by penetrants, substrata, depth of planting and storage conditions.** *Bot. Gaz.* 105, 1943 (251–6). O.B.D.

23.24. Formation of Stands by Planting

23.24 : 23.21 : 23.6. MCCOOL, G. **Planting of forest trees.** *Irish For.* 1 (1), 1943 (47–8).

Short notes on fences, drainage, selection of species (10 tabulated) and the best type of plants.

23.24 : 12.26–8 (76.2) : 23.26. BULL, H., and MUNTZ, H. H. **Planting Cottonwood on bottomlands.** *Bull. Miss. agric. Exp. Sta.* No. 391, 1943. pp. 18.

Recommendations are made for the planting of *Populus deltoides virginiana* in the Yazoo-Mississippi Delta and similar bottomland regions. Only those sites should be chosen which are neither extremely dry in the late summer and autumn nor deeply flooded in the winter and spring. The seedlings should be planted during the dormant season (preferably in February) at 6-ft. intervals in ploughed furrows 10 ft. apart, and should be released from the competition of other vegetation at least once (preferably twice) during the first growing season. Protection from fire and grazing is essential. Information is given on planting stock, on methods of planting, and on the growing of nursery stock from seed. Net returns from Cottonwood plantations will vary according to the value of the land, the tax rate, the cost of planting, and various other factors, but it is expected that such plantations, under intensive management and with frequent thinnings, will prove profitable even on rather costly and heavily taxed land.

23.24 : 12.26–8 (73). **Directions and suggestions for planting Cork Oak (*Quercus suber*) acorns.** [Crown Cork and Seal Co., Inc., Baltimore, Md.] [n.d.] pp. 2.

23.24.1. *Planting Material*

23.24.1 : 12.26–8 : 21.64 : 56.01. **Effect of diameter of Teak stump used on survival percentage and early height growth.** *Indian For.* 70, 1944 (79–80).

In an experiment carried out in the Bori forests, Teak stumps over ¼ in. in diameter showed a 15 per cent. higher survival and over 100 per cent. greater height growth than stumps of smaller diameter. Results indicate that, under the conditions of the experiment, it is probably not worth while to use stumps as small as 0·3 to 0·4 in. diameter, and that stumps of 0·4 to 0·5 in. diameter should not be used if larger sizes are available.

23.24.2. *Methods of Planting*

23.24.2 (54.6) : 23.21. FIRDAUS, A. A. **The afforestation of Shankaracharya Hill.** With a note by W. D. M. Warren. *Indian For.* 70, 1944 (83–5). [Forest Research Division, Srinagar, Kashmir.]

On an area entirely devoid of tree growth owing to heavy grazing, experiments in afforestation by planting in deep pits were unsuccessful. However, following extensive contour trenching on the Gradoni system, plantings in the trenches of both coniferous and hardwood stock were highly successful, the plants showing a much higher percentage of survival and a faster and more vigorous growth than those planted in pits. The following species did particularly well:—*Robinia pseudoacacia, Ailanthus glandulosa, Morus alba, Cedrus deodara, Pinus excelsa, P. halepensis, P. canariensis, P. longifolia, Cupressus arizonica* and *Melia azedarach.*

23.25. Formation of Stands by Vegetative Reproduction

23.25 : 12.26–8 : 12.11.22. LEONTIEV, V. **Acceleration of growth in suckers of *Haloxylon aphyllum*.** *C. R. Acad. Sci. U.R.S.S.* 39, 1943 (198–200). A.P.B.

Since propagation of *Haloxylon aphyllum* by seed is not always dependable, and since the planting of cuttings is a costly operation, the author has investigated the possibility of using suckers for the regeneration of this species. Young and medium-aged stumps measuring 24 cm. or less in diameter generally produce abundant surculose growth when cut above the root crown. These suckers normally give definitely poorer growth than seedlings of the same age, but the repeated removal during several seasons of all but one sucker (the most vigorous) from each stump has been shown to result in the greatly increased growth of the remaining sucker. Trees of *H. aphyllum* produced in this way may reach a height of more than 3 m. and a stem diameter of 8 cm. within 3 years. By using this method of regeneration in addition to natural seeding the period between fellings can be reduced from 30 to 10 years.

23.26. Plant Rearing. Nursery Practice

23.26 (89). LOPEZ, E. D., and CUSSAC, C. M. Cartilla forestal. I. Viveros. [**Forest note. I. Nurseries.**] [*Publ.*] *Min. Ganad. Agric. Republ. Oriental Uruguay* No. 65, 1943. pp. 34. [Span.] C.G.B.

A short guide to nursery practice under Uruguayan conditions.

23.26.4 : 23.23.3 : 12.25 : 12.11.23 : 11.47.12. MUNTZ, H. H. **Effects of compost and stand density upon Longleaf and Slash Pine nursery stock.** *J. For.* 42, 1944 (114–8). [Cooperative Farm Forest Research Project, Stoneville, Miss.]

Compost applied at the rate of 1 inch depth (approximately 23 tons dry weight per acre) resulted in increased top development, diameter growth, tap-root length, root extent, and green weight of seedlings of *Pinus palustris* and *P. caribaea*, and in a higher percentage of plantable seedlings than from untreated seedbeds. A study of varying conditions of stand density indicated that approximately 30 seedlings per sq. ft. would give best results, and that seedling density may be increased by the use of compost.

Heavier treatments of compost caused chlorosis in the Pine seedlings; this was corrected by spraying with a 1-per-cent. solution of $FeSO_4$.

23.27. Arboriculture

23.27 : 42.5 : 23.24.2. CHADWICK, L. C. **Shade trees in post-war times.** *Shade Tree* 16 (8, 9, 10), 1943 pp. [6]. [Ohio State Univ.]

After a brief discussion on the probable post-war trend of arboriculture, the author reviews the fertilizer situation in the United States for 1944 and comments upon three recent orders dealing, respectively, with (1) the delivery and use of fertilizer, (2) organic nitrogenous material, and (3) maximum prices of mixed fertilizer, superphosphate and potash.

Practical suggestions are made on the treatment of chlorosis in trees, puddling the roots of small plants, the removal of burlaps when plants are set, puncturing or breaking the ball of earth that surrounds the roots, and on the best method of replacing soil backfill.

23.6. *Care of Regeneration in the Initial Stage of Establishment*

23.61 : 12.25 : 56.01. PESSIN, L. J. **Stimulating the early height growth of Longleaf Pine seedlings.** *J. For.* 42, 1944 (95–8).

A progress report is given of an experiment begun in 1939 to determine (1) the conditions of ground-cover most conducive to the growth of Longleaf Pine (*Pinus palustris*) seedlings and (2) the effect of watering, fertilizing and mulching on seedling development. After 4 growing seasons the outstanding result of the study is that the height growth of seedlings on plots that were denuded of ground cover has been significantly greater than on those that were spaded, burned, or untreated except for the removal of woody plants—the height growth being 26·30, 5·68, 3·28 and 5·57 in. respectively. Supplementary treatment comprising watering, fertilizing, and mulching, either singly or in combination, appears to have had little or no effect. This study indicates the desirability of developing practical ways of removing competing vegetation from around Longleaf Pine seedlings in order to shorten or avoid the period of extremely slow early growth that is characteristic of the species under usual field conditions.

24. TENDING OF STANDS AND TREES

24.1. *Cleanings*

24.1 : 12.26–8 : 56.02. OSTROM, C. E., and HOUGH, A. F. **Early weeding in northern hardwoods.** *J. For.* 42, 1944 (138–40). [Allegheny Forest Exp. Sta.]

Light, medium and heavy weeding in 13- and 18-year-old third-growth stands on northern hardwood areas has resulted in increased diameter growth of residual stems of all crown classes during the first five years following treatment, in a marked increase in the number of unsuppressed crop trees, and in the conversion of

many sprout clumps into single-stemmed crop trees. It is shown that the removal of a third to nearly a half of the basal area is preferable to lighter treatments.

24.2. *Thinnings*

24.2 : 12.25 : 33.0. CLEAR, T., **Thinning of young conifer stands.** *Irish For.* 1 (1), 1943 (24–7).

This paper gives an outline of the principles of thinning in general and of thinning young conifers in particular, using Scots Pine and Spruce to illustrate many of the points, e.g. the value of pre-thinning Scots Pine in the early thicket stage to determine quality; the types of thinning needed for the proper crown development of trees selected to form the final crop, and for the control of disease, and to supply special markets; rules and methods to indicate the grade of thinning needed.

Nearly 100,000 acres of conifers have been planted in Ireland in the last 20 years and the imminent problem of disposing profitably of the thinnings of pole woods is discussed. After fully exploiting the varied local demands, attention should be turned to possible new methods of utilization as in the manufacture of pulp, boxes, hutting, fibre board and plastics. It is pointed out, however, that the so-called commercial thinning or intermittent yield management, which may appear financially sound, is bad long-term forestry.

24.21 (485) : 22.83.2 : 07.7. HEDEMANN-GADE, E. Röjningsgallra ungskogen under nu rådande bränslebrist. **[Clearance thinning of young forests should be carried out during the prevailing fuel shortage.]** *Skogsägaren* 18, 1942 (85–7). [Sw.]

With the present demand, particularly in southern and central Sweden, for small-sized stems for use as motor fuel or charcoal wood, clearance thinnings can be made economically in very young stands. In mixed stands the object is generally to remove Birch, Aspen and Sallow (*Hippophäe rhamnoides*). However, not all overshading broadleaved trees should be removed in the first operation. To obtain a satisfactory yield the admixture of broadleaved trees retained in the stand should be about 30 per cent. of the volume in the younger age classes. In relatively large areas the most suitable time for the operation is when the trees are 15–20 years old. As a rule 6–10 cu. m. of wood, stacked measure, can be removed per ha.

Ordinary axes are not suitable for the work. The Sandvik axe with interchangeable blades is an excellent tool, while in very young stands it is best to use a knife of the Banko type. R. P. J.

24.3 *Opening of the Canopy. Release and Improvement Fellings*

24.31 : 12.25. MACDOUGAL, D. T. **The effects of girdling on Pines.** *Amer. J. Bot.* 30, 1943 (715–9). O.B.D.

The following observations are made on the effects of girdling on 24 trees of Monterey Pine (*Pinus radiata*) over a period of 25 years:—

(1) Girdling during the resting season, September to January, may result in formation of callus, but the death of the tree will take place in the ensuing season. Similar effects follow defoliation.

(2) Inactivated cambium below a girdle may again become active if it receives material through bridges developed during the first season. Growth of branches arising in the inactivated zone may continue.

(3) Periods of growth of callus cambium are not invariably identical with those of normal cambium.

(4) Growth in the basal flare of a Pine trunk below a length of inactivated cambium may continue several seasons, an activity to be connected with the capacity of the mycorrhizal root systems to synthesize organic compounds from soil material.

(5) Girdling of one member of a Y-shaped tree was followed by the development of a heavy callus above the girdle, abnormal increase in thickness due to exaggerated growth of parenchyma, and the deposition of abundant starch in rays and wood parenchyma.

A hitherto unknown immediate response to girdling was detected by dendrographs attached above and below girdles. Girdling during the growing season was followed by a continuation of cambium activity below the girdle for a fortnight, after which it ceased, to be resumed only with the formation of callus bridges. Cambium activity above the girdle ceased within a few hours throughout a region known to extend for 75 cm., and was not resumed until 10 to 15 days later. *From author's summary.*

24.31 : 12.25–8. COOK, D. B. **Sodium arsenite as a tree killer.** *J. For.* 42, 1944 (141–3). [New York State Conservation Department.]

It was found that the application in the late summer or autumn of a 2-lb. solution of sodium arsenite by means of a frill girdle, following the technique of Cope and Spaeth [cf. *J. For.* 29, 1931 (775–83); *For. Abstr.* 5 (77–80)], resulted in the complete killing of the aerial parts of nearly all treated trees, whereas the root survival and sprouting vigour varied considerably by species. The effect of the poisoning on each of the thirteen species treated is noted briefly. It is concluded that the varying effectiveness of the treatment and its possible danger to man and beast make it of limited value in connexion with forest and wild-life management in the hardwood areas of the north-eastern States.

24.4. *Shelterbelts. Windbreaks*

24.4 : 12.26–8 : 23.21 : 23.24.2. PETRIE, S. M. **A plea for shelterbelts of broad-leaved trees.** *Irish For.* 1 (1), 1943 (16–9).

To restock shelterbelts and screens destroyed by the conversion to food production of land previously used for stock breeding and rearing, the author advocates planting indigenous broadleaved trees rather than exotic conifers which he considers are inefficient, uneconomic and aesthetically misplaced. Advice is given on the choice of suitable broadleaved species and on method of establishment and pruning. Conifers should be restricted to areas of poor soil and high-lying sites but are permissible as temporary nurses on open lowland sites.

24.4 (410) : 23.21 : 97.2 : 23.24. GUILLEBAUD, W. H. **Shelter belts on upland farms.** *Agriculture* (*J. Minist. Agric.*) 50, 1943 (317–21). [H.M. Forestry Commission.] L.S.

The author discusses briefly the main problems to be considered in establishing shelterbelts in the hill country of Great Britain, including width of belt, choice of species, preparation of site, fencing, planting material, and the management of established plantations.

It is recommended that belts should be at least 2½ to 3 chains wide in order that they will provide some poles

and other useful material. Sitka Spruce (*Picea sitchensis*) is the most generally useful tree for shelterbelt planting in the uplands as it is tolerant of a wide range of soil conditions, is resistant to exposure, and will grow relatively fast under exposed conditions. Dry sites that are facing south should be planted with Scots Pine (*Pinus sylvestris*) up to about 1,100 ft. and with mixtures of Scots Pine and *P. contorta* at high elevations. Austrian Pine (*P. nigra*) is a good shelterbelt tree on limestone soils where Beech may also be grown, though this species is of slow growth and often difficult to establish.

24.4 (47.6) : 91.3 : 11.62 : 97. REMEZOV, N. P., and SMARAGDOV, D. G. Kompleksnoe reshenie voprosov obleseniya stepey. [**Complex solution of the problem of the afforestation of steppes.**] *Pedology* 3, 1943 (34–40). [Russ.e.] H.S.B.

To ensure the greatest possible benefit from shelterbelts in the steppe regions of the European part of the Soviet Union it is essential to plan systematically the location of such belts. Furthermore, it is necessary to counteract by special measures, e.g. irrigation schemes, such adverse effects as the belts may have on the water régime of the bottomlands of the southern and southeastern rivers, so that the improvement of one locality will not have adverse effects elsewhere. Large-scale shelterbelt planting affects directly or indirectly a variety of interests and should be supervised by a permanent inter-departmental commission.

24.4 (78) : 23.21 : 23.6. **Tree shelterbelts or windbreaks helpful on the northern Great Plains.** *Conserv. Folder U.S. Dep. Agric.* No. 12, [n.d.] A.P.B.

For the successful establishment of shelterbelts on the northern Great Plains it is recommended that (1) the site should be carefully chosen and prepared, (2) only hardy species well adapted to the locality should be used, (3) the species should be mixed, (4) advantage should be taken of any additional moisture in the drier parts by planting along natural drainages, (5) the ground should be cultivated as long as weeds and grasses persist, (6) livestock should be permanently excluded, and (7) adequate fire protection should be provided.

24.5. *Pruning*

24.51 : 21.61. CROIZAT, L. **Observe natural forms in pruning.** *Amer. Nurserym.* 79 (1), 1944 (5–8). [Arnold Arboretum, Harvard Univ.]

A generalized discussion on some of the growth forms and patterns assumed by the trunks and main branches of various tree groups and their relation to pruning.

3. FOREST UTILIZATION. FOREST TECHNOLOGY

31. PROPERTIES AND ANATOMY OF WOOD.

WOOD RESEARCH

31.0. *General Information on Woods*

31.0 : 12.26–8 (728 : 8) : 31.41. RECORD, S. J. **Random observations on tropical American timbers.** *Trop. Woods* No. 77, 1944 (1–10).

These notes refer in part to certain characteristics and properties relating to the identification of specimens of *Taxodium mucronatum*, *Bucida buceras*, Panama 'Candle Wood' (*Amyris* sp.), and 'Cashier' (? *Chloroleucon* sp.). Reference is also made to (*a*) some proposed substitutes for Balsa (*Ochroma*), (*b*) timbers naturally resistant to *Teredo*, (*c*) Humiriaceae in Central America, and (*d*) miscellaneous determinations.

Among the light-weight woods that may possibly serve as substitutes for Balsa are Flotadora (Euphorbiaceae), *Omphalea oleifera*, *Heliocarpus* spp., *Cavanilesia arborea*, *C. platanifolia*, and *Pretina* (*Pisonia* sp.).

Timbers more than usually resistant to *Teredo* attack include *Dicorynia paraensis*, Foengoe or Vonkhout (? *Parinarium campestre*), and Manbarklak (? *Eschweilera longipes*).

31.0 : 12.26–8. **Foreign timbers—2. Notes on Freijo (*Cordia goeldiana*) and Quaruba (*Vochysia* spp.).** *Leafl. For. Prod. Res. Lab.* No. 29, 1943. pp. 2.

Short notes are given on the size of the tree and on the characteristics, properties and qualities of the wood of the two species.

31.1. *Structure. Anatomy. Identification*

31.1. HOWARD, A. L. **Supplement to 'Studies on the identification of timbers'.** Macmillan and Co., Ltd., St. Martin's St., London. 1943 pp. 19. Price 5s.

Cf. *For. Abstr.* 4 (107). This supplement contains a further 153 photomicrographs including a number of important timbers omitted from the original volume.

31.1. RECORD, S. J. **Keys to American woods** (continued). *Trop. Woods* No. 76, 1943 (32–47).

The tenth key in this series deals with woods with storied structure. These include 149 genera of 29 families (mostly tropical). The largest groups belong to the Leguminosae (77 genera) and the Malvales. The storied arrangement of some or all of the elements in these woods gives rise to the horizontal markings known as 'ripple marks'.

31.1. RECORD, S. J. **Keys to American woods** (continued). *Trop. Woods* No. 77, 1944 (18–38).

These two keys are the eleventh and twelfth in the series and deal respectively with woods with resin or gum ducts and woods with reticulate parenchyma. The former group includes 52 genera of 17 families with axial ducts and 22 genera of 6 families with ducts in the rays. The twelfth key includes the American representatives of 161 genera of 97 different families.

31.1 : 01.2 : 06.1. YATSENKO-KHMELEVSKI, A. A. Standartizatsiya terminov razmerov, upotreblyaemykh pri opisanii drevesiny. [**Standardization of size terms used in the description of wood.**] *Trav. Inst. bot. Tbilissi* No. 7, 1939 (109–14). [Russ.e.]

A short account is given of the activities of the committee of the International Association of Wood Anatomists that was entrusted with the task of standardizing these terms. The terms as recommended by the association are given in Russian, Georgian, English, French, and German.

31.1 : 12.25. KOLLMANN, F., and ANTONOFF, M. Beitrag zur Erforschung des submikroskopischen Feinbaus von Holz. [**Contribution to the investigation of the submicroscopic structure of wood.**] *Holz* 6, 1943 (41–5). [G.g.] [Mechanish-Technologisches Institut der Reichsanstalt für Holzforschung.] P.R.

It is shown that the inclination of the fibrils in the wood of *Pinus sylvestris* increases with age during the

first twelve years or so of the tree's life and remains relatively constant thereafter. Within the annual ring the angle of inclination is on the average 7° greater in late wood than in early wood. No relation appears to exist between the fibrillar angle and ring width or proportion of late wood. The fibrillar angle was determined from X-ray diagrams using 80μ-thick sections taken from the early wood and late wood of every ring of a 47-year-old stem. It is pointed out that there is a close relation between the inclination of the fibrils and the tensile strength of the wood, the strength increasing as the slope of the fibrils becomes steeper.

31.1 : 12.26–8 (47.6). YATSENKO-KHMELEVSKI, A. A. K opredeleniyh kavkazskikh predstaviteley roda *Acer* L. po stroeniyu ikh drevesinÿ. [**On the determination of the Caucasian species of *Acer* L. according to wood structure.**] *Not. system. geogr. Inst. bot. Tiphlis.* No. 7, 1939 (20–36). [Russ.georgian:]

The identification key presented is based on a study of the micrography of the wood of Caucasian trees and shrubs that is being prepared by the author.

31.1 : 31.22.2. FREY-WYSSLING, A. Weitere Untersuchungen über die Schwindungsanisotropie des Holzes. [**Further investigations on the anisotropy of shrinkage in wood.**] *Holz* 6, 1943 (197–8). [G.g.] P.R.

Observations on the summerwood of conifers indicate that the radially directed middle lamellas between the cells (consisting of the intercellular substance and the primary cell walls) are broader than the tangential lamellas. This results in the regularly observed fact that the tangential shrinkage of wood is greater than the radial shrinkage.

31.2. *Physical Properties*

31.2. **Physical properties of wood.** *Mech. World* 114, 1943 (702–3).

31.2 : 12.26–8. GRÖSSLER, W. Holztechnologische Untersuchungen an Hochgebirgsbuchen. [**Wood-technological investigations on high-mountain Beech.**] *Holz* 6, 1943 (81–6). [G.g.] P.R.

Data are given on the density, shrinkage and strength properties of high-mountain Beech timber. This was found to be not inferior, on the whole, to Beech timber grown in the plain, except for uses requiring particularly high strength or rigidity. On the average, the high-mountain timber had a lower density than that grown in the plain.

31.22. Relation to Water, Air, Gases

31.22.1 : 12.25. MICHELS, P. Der Nasskern der Weisstanne. [**Wet heartwood of Silver Fir.**] *Holz* 6, 1943 (87–99). [G.g.] P.R.

Investigations on the content and distribution of moisture in several stems of Silver Fir from Freising near Munich showed that in all cases the inner, and in some cases the outer, heartwood had a remarkably high water content, sometimes nearly as high as that of the sapwood. The dry portion of the heartwood may be limited to a narrow ring separating the inner wet heartwood and the wet sapwood. The trees studied appeared to be perfectly healthy and it is not certain to what extent, if any, wet heartwood in Silver Fir can be attributed to a pathological condition, as has been done by some investigators.

THE CALORIFIC VALUE, IN MILLION KCALS., OF 1 CU. M. OF WOOD, STACKED MEASURE

Type of wood	*Higher value*			*Lower value*		
	Moisture per cent.	*Solid volume per cent.*	*Mill. kcal. per cu. m. stacked*	*Moisture per cent.*	*Solid volume per cent.*	*Mill. kcal. per cu. m. stacked*
Billets 3 m. long.						
Good quality coniferous wood for charcoal burning	30	58	1·05	30	50	0·90
Inferior quality coniferous wood for charcoal burning	40	52	0·91	40	44	0·77
Good quality Birch fuelwood	30	60	1·31	30	55	1·20
Inferior quality Birch fuelwood	40	53	1·12	40	43	0·91
Twisted and badly trimmed wood	30	50	0·90	40	32	0·60
Billets 1 m. long.						
Pine fuelwood	25	63	1·28	35	51	1·01
Spruce fuelwood	25	65	1·08	35	53	0·86
Mixed coniferous fuelwood	25	64	1·17	35	52	0·92
Alder fuelwood	25	62	1·15	35	50	0·91
Aspen ,,	25	62	1·08	35	50	0·85
Birch ,,	25	62	1·38	35	50	1·08
Beech ,,	25	62	1·53	35	50	1·20
Oak ,,	25	62	1·53	35	50	1·20
Sawmill waste products.						
Trimming ends, stacked as firewood	16	60	1·14	16	50	0·95
Trimming ends, unstacked	16	50	0·95	—	—	—
Slabs and lath, metre wood	30	46	0·83	60	38	0·59
Chips, splinters, etc., with sawdust	40	40	0·70	60	35	0·54
Chips, splinters, etc., clean	40	35	0·61	60	30	0·46
Turnings (klyvspån) and sawdust	16	30	0·57	60	30	0·46
Cutter-block dust (Kutterspån)	16	20	0·38	16	15	0·28

31.22.1 : 07.7. **Remote meter determination of moisture content.** *W. Cst. Lumberm.* 71 (1), 1944 (61).

In the tests noted a Tag-Heppenstall moisture meter was used to make determinations of moisture in timber inside kilns, the readings being taken at 12–50 ft. distance. The tests gave promising results.

31.24. Calorific Value

31.24 : 33.06 : 12.25–8 : 31.23 : 31.3. LUNDBERG, H.A. Varmeinnehället i en kubikmeter ved. **[The calorific value of a cubic metre of wood.]** *Svensk PappTidn.* 46, 1943 (293–300). [Sw.] P.O.

'The author gives a survey of several investigations into the chemical composition, the calorific value, the specific gravity and the shrinkage of different kinds of fuelwood. As a result the calorific value in Kcals. per cu. m. solid fuelwood is given in simple equations and graphs. Finally the relation between the wood content per cu. m. piled and per cu. m. solid wood is discussed and the calorific value in Kcals. per [cu.] m. piled fuelwood is calculated.'

The article is summarized in the table on page 26 which gives a range of calorific values for cu. m. of wood, stacked measure. In general, two values are given in the table, a higher value for wood of lower moisture content and higher solid volume percentage, and a lower value for moister wood with a lower solid volume percentage. In general, a calorific value somewhere between the higher and the lower figures may be expected. R. P. J.

31.27. Mechanical Strength

31.27. LEONTIEV, N. L. **Additivity principle in study of properties of wood.** *Zavod. Lab.* 9, 1940 (351–3). Brit. Chem. Physiol. Abstr. B I, 1943 (451). P.R.

Compressibility and bending strength (for both impact and static bending) are to some extent independent of the size of the specimen.

31.27 : 12.25. KORTSCHINSKI, I. L. **Dynamic properties of wood substance.** *Zavod. Lab.* 9, 1940 (344–51). Brit. Chem. Physiol. Abstr. B I, 1943 (451). P.R.

The bending hysteresis of Fir beams is measured at various frequencies of vibration.

31.27 : 12.25 : 31.23 : 31.1. SCHRADER, O. H. **Some aspects of specific gravity variations and anatomical features affecting the strength of small clear Douglas Fir beams.** *For. Cl. Quart.* 16 (2), 1942–43 (4–11).

Tests on Douglas Fir specimens measuring 0·3 × 0·3 × 12 in. indicated the following relationships:—High-strength specimens tend to have the most uniform distribution of specific gravity and low-strength specimens the most erratic; modulus of rupture is correlated with the angle of the pit-apertures; the relative thickness of the secondary wall of the adjacent springwood and summerwood cells (used as an index of a plane of weakness between these tissues) is correlated with modulus of elasticity and modulus of rupture in kiln-dried but not air-dried material.

31.27 : 12.26–8 : 33.15. FULLER, F. B., and OBERG, T. T. **Fatigue characteristics of natural and resin-impregnated, compressed, laminated woods.** *J. Aero. Sci.* 10 (5), 1943 (81–5).

Hard Maple and Yellow Birch woods, and Hard Maple and Yellow Birch laminated and treated materials with specific gravities varying from 0·68–1·38, were subject to static bending tests using square specimens, and fatigue bending tests with notched and unnotched round specimens. Full results are given and these indicate that the endurance bending stress for woods is about 0·2 × the static bending stress.

31.27 : 31.22.1. PERELYGIN, L. M. **Effect of moisture on resistance of wood to impact bending.** *Zavod. Lab.* 8, 1939 (608–11). Brit. Chem. Physical. Abstr. B I, 1943 (409). P.R.

The work required to bend wood blocks by impact decreases when the moisture content (5–104 per cent.) of the wood increases; Oak is the only exception. The decrease is large for Birch, Larch, Spruce, and Aspen, less for Pine and Linden, and small for Ash, Acacia, and Beech.

31.3. *Chemical Properties*

31.3. **The lignin problem. A review of significant advances in solving a pressing structural puzzle.** *Pulp Paper Mag. Can.* 45, 1944 (17–23).

A review by E. D. V. Percival of the London Chemical Society of recent investigations on the chemistry of lignin. Eighty-three references are cited.

31.3. BROOKBANK, E. B., BRAUNS, F. E., LEWIS, H. F., and BUCHANAN, M. A. **New derivatives of lignin.** *Pulp Paper Mag. Can.* 44, 1943 (805–6).

In this report some 18 lignin esters of monobasic aliphatic acids and four of dibasic aliphatic acids are characterized.

31.3 : 01.4. COPPICK, S. **Viscosity and molecular weight. II. Depolymerization during lignification.** *Paper Tr. J.* 117 (26), 1943 (29–31). P.R.

A method is described by which it is possible to follow the polymerization of the carbohydrate constituent of wood at various stages of delignification.

31.3. EASTHAM, A. M., FISHER, H. E., KULKA, M., and HIBBERT, H. **Studies on lignin and related compounds. LXXIV. Relation of wood ethanolysis products to the Hibbert series of plant respiratory catalysts. Allylic and dismutation arrangements of 3-chloro-1-(3, 4-dimethoxyphenyl)-2-propanone and 1-bromo-1-(3, 4-dimethoxyphenyl)-2-propane.** *J. Amer. chem. Soc.* 66, 1944 (26–32). O.R.S.

31.3. CREIGHTON, R. H. J., GIBBS, R. D., and HIBBERT, H. **Studies on lignin and related compounds. LXXV. Alkaline nitrobenzene oxidation of plant materials and application to taxonomic classification.** *J. Amer. chem. Soc.* 66, 1944 (32–7). O.R.S.

31.3 : 12.26–8. KULKA, M., FISHER, H. E., BAKER, S. B., and HIBBERT, H. **Studies on lignin and related compounds. LXXVII. Re-investigation of the ethanolysis products of Maple wood.** *J. Amer. chem. Soc.* 66, 1944 (39–41). O.R.S.

31.3 : 12.25–8. MACGREGOR, W. S., EVANS, T. H., and HIBBERT, H. **Studies on lignin and related compounds. LXXVIII. Chromic acid oxidation of lignin-type substances, wood ethanolysis products and wood.** *J. Amer. chem. Soc.* 66, 1944 (41–4). O.R.S.

31.3. ENDERS, C., and HEGENDÖRFER, M. **Yeast growth substances in wood.** *Biochem. Z.* 307, 1941 (120–2). Brit. Chem. Physiol. Abstr. A III, 1944 (87). P.R.

Samples of wood are freed from tar by ether extraction, boiled for two hours with 20 parts of 0·1N-$NaOH$, and filtered; the filtrate is precipitated with $Ca(OH)_2$ and filtered, saturated with CO_2 at 70°, filtered again,

and concentrated. After treatment with kieselguhr the extract is further concentrated so that 1 cc. ≡ 0·25 g. of wood. Alternatively interfering substances are precipitated from the first extract by 2 volumes of 96-percent. alcohol, the alcohol is removed, and the remaining extract is concentrated as above. Yeast growth substances are present in all extracts except those from Bavarian Beech wood. Tannins, which inhibit growth substances, are not completely removed by the alcohol treatment of extracts of woods with a high tannin content.

31.3. RABIN, J. **Wood in the construction of rectifying columns [for ethyl alcohol].** *An. Ass. Quim. Brasil* No. 2, 1943 (121–5). Brit. Chem. Physiol. Abstr. B III, 1944 (26). P.R.

A comparison of rectification of EtOH in wood and metal columns shows that the former is equally efficient while being more economical and easier to construct.

31.3 : 12.25. COPPICK, S., and JAHN, E. C. **Nitrated wood: fractionation and molecular magnitudes.** *Industr. Engng. Chem.* (*Industr. Ed.*) 35, 1943 (890–4). [New York State College of Forestry at Syracuse Univ.] L.S.

Cf. *For. Abstr.* 3 (221). Nitrated Spruce and White Pine contain considerable amounts of ligneous material; most of it may be removed by alcohol extraction to yield a product which appears to contain 5 per cent. lignin and has a high viscosity. The average molecular size of nitrated Spruce and White Pine woods is equivalent to that of the nitrate from moderately bleached cotton linters. However, the distribution of molecular sizes seems to be much wider than that of nitrated cotton linters or pulp. Evidence points to the existence of large amounts of material in wood having exceptionally large molecular size. It appears that the chain length of the cellulose in the wood is not reduced to the same extent by nitration as by cooking and bleaching processes for isolating cellulose. There is evidence for the existence in nitrated wood of easily severed linkages; the result, upon fission, is a decrease in viscosity. The behaviour of nitrated wood to bleaching and to hot-water and hot-alcohol extraction suggests that these are lignin-carbohydrate linkages, although there is a possibility that they connect other residues or are of some other type, such as ester cross linkages or glucosidic linkages connecting furanose rings in hemicelluloses. *From authors' summary.*

31.3 : 12.25. ERDTMAN, H. Tallkärnvedens fenoliska substanser. IV. **[Phenol substances of heartwood of Pine. IV.]** *Svensk PappTidn.* 46, 1943 (532). [Sw.] C.G.B.

In this paper on membrane-forming substances some results are incidentally mentioned from a study of the heartwood of *Pinus strobus*, *P. nigra*, *P. montana*, *P. banksiana*, and *P. palustris*. All appear to contain phenols of the 'pinosylvin' type, sometimes with phenolic substances belonging to other groups (flavones). M. L. C. W.

31.3 : 12.14.8 : 12.25. LEHMANN, E. **Pine bark extracts free of phlobaphene.** *German Patent* No. 729,106, Nov. 12, 1942 (Cl. 12*o*. 26.01). Chem. Abstr. 38 (457). P.R.

Pine bark is extracted with a fat solvent. The extract is heated with an alkaline substance and filtered. The insoluble part is bleached with hypochlorite, Cl, alkaline H_2O_2, etc., in a manner used for bleaching cellulose.

31.3 : 12.25–8. HUSEMANN, E. **Wood polyoses: constitution.** *J. prakt. Chem.* 155 [ii], 1940 (13–64). Brit. Chem. Physiol. Abstr. A II, 1943 (322–3). Brit. Cotton Ind. Res. Ass. Summ. 24, 1944 (66). P.R.

Determinations have been made of the degree of polymerization of xylans from wheat straw and Beech wood and their acetates, ethers and ether acetates. The results indicate that the xylans are linear products of about 150 xylose units and that they have a regular series of very short side chains. Products obtained by treating Pine wood with chlorine dioxide and pyridine and then with 8 per cent. caustic soda have also been studied. Linear molecules are indicated. An arabogalactan extracted from Larch (*Larix occidentalis*), and its acetylation and nitration derivatives, were found to be highly branched compounds. The results as a whole show that wood polyoses are of such low degrees of polymerization that they must be removed from cellulose prior to the preparation of fibres or films.

31.4. *Durability. Decomposition*

31.42. Attack by Plant Organisms

31.42.11 : 12.21. **Dry rot in unoccupied and damaged houses.** *Wood* 9, 1944 (41). [From a paper issued by the Ministry of Health to County Council Housing Authorities.]

There is evidence that dry rot (caused by the fungus *Merulius lacrymans*) is on the increase in domestic buildings in Britain at the present time. The reasons for this increase are indicated with reference to the methods (contagion and infection) by which the fungus spreads. Measures for eradicating dry rot and precautions to be taken against its establishment and spread are listed.

31.43. Attack by Animal Organisms

31.43 : 12.25 : 13.2 : 45.3 : 33.36.1. BESS, H. A. **Insect attack and damage to White-Pine timber after the 1938 hurricane in New England.** *J. For.* 42, 1944 (14–6). [U.S. Bureau of Entomology and Plant Quarantine, New Haven, Conn.]

An analysis was made of the damage done by insects to White Pine (*Pinus strobus*) trees and logs following the New England hurricane of 1938. Bark beetles and borers were in sufficient numbers in the spring of 1939 to infest susceptible timber, while pinhole borers did not become abundant until 1940. Practically no standing trees were killed by bark beetles after the storm, and many of the wind-felled trees that had roots intact were undamaged by insects at the end of the second season after the storm.

Water storage of logs gave good protection against insects and staining, and logs piled on dry sites some distance from felled trees suffered comparatively little damage. Covering logs with straw and boughs gave more effective protection than did spraying with chemicals, which in practically all cases did not reduce damage sufficiently to cover the cost of treatment.

31.43 : 13.2 : 33.36.1. **The furniture beetle (*Anobium punctatum*).** *Agric. Gaz. N.S.W.* 54, 1943 (372) L.S.

A brief description is given of *Anobium punctatum*, a beetle which commonly infests flooring, furniture, and other articles made of Pine and some other timbers in New South Wales. The application of creosote oil to infested wood is generally the most effective method

f control. Kerozene (½ pt.) in which paradichloro-enzene (1 oz.) has been dissolved, may also be jected into the holes.

1.43 : 13.2 (41.5). O'Mahony, E. **A note on some eetles introduced into Ireland.** *Ent. mon. Mag.* 79, 1943 79).

This note includes the first record of *Latheticus ryzae* Waterh. in Ireland. A single example was taken om a piece of wood from an imported tea chest.

1.43 : 13.2 (71.1). Leech, H. B. **Miscellaneous ecords of beetles in British Columbia.** *Proc. ent. Soc. .C.* 40, 1943 (26–7). [Dominion Forest Insect Labora-ory, Vernon, B.C.] I.I.E.

Records a live specimen of *Chrysophana placida* ec. in a pupal burrow in a barn built of seasoned Douglas Fir lumber in 1920 and painted within a year r so.

1.43 : 33.36.1. Becker, G. Verfahren zur Bekämp-ung von tierischen Holzzerstörern. [**Procedure for ie control of animal pests of timber.**] *German Patent* Jo. 735, 845, May 28, 1943. In *Holz* 6, 1943 (208). P.R.

The method aims primarily at protecting non-mpregnated structural timber against the ravages of the eath-watch beetle. It is based on the observation that ie beetles attack coniferous timber only, which, it is ncluded, is due to the fact that such timber contains ibstances attractive to ovipositing females. Experi-ents showed that the bicyclic terpenes (e.g. pinene, ellandren, or coal-tar oil boiling at 150–200° C.) are articularly effective in this respect. Traps, e.g. of ne wood, containing apertures to facilitate oviposition, nd impregnated with substances such as those noted ove, are placed in convenient places, and the eggs or oung larvae are eventually destroyed. The traps can so be smeared with glue in order to catch the beetles.

.43 (43.1–5) : 13.2. Madel, W. Bemerkenswerte chädlingsmeldungen I–III. [**Noteworthy reports of ests I-III.**] *Z. hyg. Zool.* 32, 1940 (170–5); 33, 1941 3–90). [G.] *Abstr.* in *Z. PflKrankh.* 53, 1943 (244). G.] R.A.E. 32 A (70).

The pests recorded include *Criocephalus rusticus*, L., *nobius mollis*, L., *Xestobium rufovillosum*, Deg., tacking timber in houses in Germany. The Mala-iids, *Anthocomus bipunctatus*, Harrer, and *A. fascia-s*, L., are predacious on timber pests.

31.44. Injury by Chemicals

.44 : 31.42.1 : 12.26–8 : 44.3 : 56.02. Lorenz, R. C. **iscolorations and decay resulting from increment bor-gs in hardwoods.** *J. For.* 42, 1944 (37–43). [Minne-ta Agricultural Exp. Sta.]

Field tests were made, using trees of Basswood *ilia americana*), Sugar Maple (*Acer saccharum*), ellow Birch (*Betula lutea*) and Paper Birch (*B. pyrifera*), and stored Paper Birch bolts, to determine e cause of stain and decay in wood adjacent to ounds made by increment borings, and if possible to ntrol such injury by disinfecting with 70 per cent. ohol and using plugs of Black Locust heartwood.

It was found that stain of chemical origin and not ie to micro-organisms invariably developed in the od adjacent to borer holes, regardless of preventive easures used; cankers and decay were commonly but t always present. Black Locust plugs had no effect stain, but reduced somewhat the incidence of heart t.

31.45. Injury by Fire

31.45 : 33.36.2. Bryan, J. **The fire hazard.** *Wood* 8, 1943 (260–2).

A general discussion of fire resistance in timber and of fire-retardant treatments.

31.8. *Quality and Defects of Timber*

31.8 : 12.25 : 31.22.1. Eades, H. W. **Investigation of brown streak in Western Hemlock used for aircraft purposes.** Forest Products Laboratories, Vancouver. 1943. pp. 4.

Dark streaks in the wood of Western Hemlock (*Tsuga heterophylla*) are nearly always associated with high local moisture content. There are three types of dark streaks:—(1) wood containing rings with wide summer-wood of high density; (2) wood of normal or low density, of which the cell structure contains some peculiarity permitting abnormal water content; (3) incipient stages of certain rot-producing fungi, e.g. *Ganoderma oregonense*. In the tests described in this paper the latter type was not encountered. Light apparatus that is used for the detection of compression wood [cf. *For. Abstr.* 3 (139)] proved unreliable in these tests owing to uniformity of results with all types of dense wood.

It is concluded that dark water-soaked streaks in Western Hemlock should be considered a degrade in aircraft stock, no matter what the cause.

Other types of streaks in this wood are 'white streak' consisting of deposits of resin or fats in cell lumina, and 'black streak' caused by the attack of certain insects in the living tree. While the former has no weakening effect on the wood, the latter, although not a form of degrade in itself, may be associated with grain separation or check.

31.8 : 12.25 : 31.27. Luxford, R. F., Wood, L. N., and Gerry, E. **Black streak in Western Hemlock.** U.S. Forest Products Research Laboratory, Madison, Wis. *Mimeo* 1500, 1943. pp. 7 + tbls.

The cause of black streak, its structure, and its influence on strength are discussed, and the following recommendations regarding its use in aircraft construction are made:—(1) 'Black Streak' shall be accepted; (2) the 'maggot chambers' shall be treated as 'bark pockets' for inspection purposes; (3) associated irregular grain shall be treated in the same way as other grain deviation.

31.8 : 12.25. Gerry, E. **Western Hemlock 'floccosoids.'** U.S. Forest Products Research Laboratory, Madison, Wis. *Mimeo* 1392, 1943. pp. 3.

Cf. *For. Abstr.* 5 (34). This short note records the result of tests on the solubility of floccosoids in various liquids, and states in conclusion that the presence of floccosoids should not cause the rejection of timber for use in aircraft.

31.8 : 12.25 : 31.2. Johnson, H. M. **Recovery of aircraft lumber from Noble Fir logs.** *Timberman* 45 (2), 1943–44 (38, 40, 42). [Pacific Northwest Forest and Range Exp. Sta.]

Of the western American conifers, Noble Fir (*Abies nobilis*) is second to Sitka Spruce in the volume used in aircraft production. This species reaches its best development in the Cascade Mountains and Coast Range of western Washington and western Oregon at elevations of 2,500–5,000 ft.; it is estimated that the total merchantable stand does not exceed 6,800 million

bd. ft. In the present paper the qualities of the wood of this species are noted briefly and results are given from a mill production study undertaken to obtain yield data for various sizes and grades of logs. The percentage lumber grade recoveries for various commercial log grades are tabulated.

31.8 : 12.26–8 : 31.2. STEARNS, J. L. **Proper selection of White Oak bending stock.** *Sth. Lumberm.* 167 (2105), 1943 (224–5).

In grading White Oak bending stock consideration must be given to (*a*) straightness of grain, (*b*) number of annual rings per inch, (*c*) density, and (*d*) defects, with reference to knots, seasoning checks, pin worm holes, sapwood, heart centre, wane, decay and shake. The requirements on these points for U.S. Navy specifications are indicated.

32. HARVESTING OF WOOD. LOGGING

32 (66.7). FRIEND, J. È. **Forestry in Ashanti.** *Wood* 9, 1944 (3–6).

An illustrated note on logging operations.

32.1. *Marking of Trees and Coupes*

32.1. SIMMONS, F. C. **Training in marking timber.** *J. For.* 42, 1944 (6–8). [U.S. Forest Service, Philadelphia, Pa.]

Marking practice for selective cutting in commercial timber sales in national forests of the northeastern United States is being taught by means of semi-permanent plots: one-half of each plot is previously marked by experts and the other half is used as a test area. Seven of these plots have been established and are being used successfully on six national forests.

32.2. *Felling and Related Operations*

32.25 : 07.7. **Chain saw filing progress.** *W. Cst. Lumberm.* 70 (12), 1943 (70–1).

Notes are given on devices recently developed for supporting power chain saws during hand filing, and also on a power filer in which the sharpening stone—a 10-in. wheel—is rotated by a small electric motor; the teeth of the saw are moved into position by hand.

32.29.1 : 07.7. LINDBERG, R. C. **Snag falling with hand and power saws. Part I—hand-sawing. Part II—power saws.** *Timberman* 45 (1), 1943–44 (30–1, 34, 36, 38, 40, 42); (2) (22, 24, 26, 28).

32.29.1 : 07.7 : 76.1. WETTERHALL, B. Stubb-brytning. **[Stump removal.]** *Skogsägaren* 18, 1942 (168–70). [Sw.]

Stumps should not be removed from young stands unless the operation is done with special care as it may result in the destruction of the whole stand. In order that stump removal be remunerative it is estimated that the minimum supply should be 20 cu. m. stacked wood per ha. and that the minimum diameter should be 20 cm.

The most efficient method of removing stumps is by tractor, the cost being approximately 2·50 kr. per cu. m. stacked wood with a daily production of about 23 cu. m. The cost rises with the use of simpler equipment, that for removal by means of a lever being 6–8 kr. per cu. m. stacked wood with a daily production of not more than 3 cu. m.

The work should be done in winter when the stumps are frozen. The wood should be piled and covered to prevent evaporation of volatile turpentine. R. P. J.

32.29.2 : 76.1. MULLOY, G. A. **Costs of brush burning.** *Silvic. Leafl. Dom. For. Serv.* No. 19, 1944. p. [1].

From data obtained in an operation in which a fairly dense stand of Jack Pine (*Pinus banksiana*), averaging 7–8 in. d.b.h., that was cut for boxwood, it is shown that with the use of skilled labour and efficient equipment the cost of brush (slash) burning can be kept below $1·00 per thousand bd. ft.

32.7. *Loss in Logging. Incidental Waste*

32.7 : 34.6 : 33.02. GRONDAL, B. L. **Why woods waste? A discussion of why loggers leave seemingly valuable material and a suggestion as to how such logs and debris might be economically recovered.** *W. Cst. Lumberm.* 70 (12), 1943 (89, 93).

This note is based on recent studies by the College of Forestry of the University of Washington. Often valuable material is left behind in logging areas because a proper 'clean-up' would involve the risk of dissatisfaction among men logging on a piece-rate basis. In tractor logging, good logs are sometimes left behind because the moving of slash that is necessary in order to get at a particular log appears to be too costly. Re-logging in slash can be accomplished with suitable light equipment. The unutilized but usable material must be concentrated at, and partly converted in, a portable plant. The design and outlay of a plant for the production in the woods of reasonably clean pulpwood are outlined. The unit is mounted on a sled, can be readily moved, requires comparatively little power, and can be serviced by a crew of 5–6 men. Pulpwood logs are cut into suitable lengths and later are split by a battery of circular saws. Bark removal is done by hand.

32.9. *Transport*

32.91.11 : 33.02. KOROLEFF, A., WALKER, J. F., and STEVENS, D. R. **Pulpwood skidding with horses: efficiency of technique.** Canadian Pulp and Paper Association and Pulp and Paper Research Institute of Canada. 1943. pp. xvi + 137 + index + tbls. Price $3·50.

A report of a study undertaken to determine efficient practices and common faults in conventional methods of skidding pulpwood by horse in Eastern Canada. Subjects dealt with include skidding crew; horses; skidding equipment and tools; analysis of time and motion studies; skidding production and costs; technique of skidding; skidways—technique of rolling; selection of skidding method; safety in skidding and rolling.

32·91·21 : 33.02. KOROLEFF, A., WALKER, J. F., and STEVENS, D. R. **Pulpwood hauling with horse and sleigh; efficiency of technique.** Canadian Pulp and Paper Association and Pulp and Paper Research Institute of Canada. 1943. pp. xiv. + 159 + index + pocket supplement. Price $3·50.

In Eastern Canada the horse and sleigh is the principal means of moving pulpwood from the woods to the landing preparatory to long-distance transportation, usually by river drive. This report describes the conventional methods used in hauling by horse and sleigh, analyses these methods from the efficiency standpoint, and includes several hundred recommendations on sound practices to be followed and faults to be avoided. Among the subjects dealt with are location, preparation and maintenance of roads and landings; hauling equipment; horses and harness;

ting in relation to hauling; loading and unloading; iliary methods; safety in hauling.

92 : 76.1. NORDQUIST, M. Buntning av långved för tning. **[Tying up long timber in bundles for floating.]** *gen* 29, 1942 (155–7). [Sw.]

Two special appliances are used for putting timber in ndles preparatory to floating. A detailed list is en of the points to be observed in making the ndles. Total costs per cu. m. for floating, sorting d landing are considerably less for wood in bundles n for wood of corresponding quality floated by gle logs.

33. CONVERSION AND PRESERVATION OF WOOD

33.0. *Utilization Categories of Wood*

0 : 31.1–2. COX, H. A. **[Forest Products.] (2) nber uses, new and old.** *J. roy. Soc. Arts* 92, 1944 1–10). [Forest Products Research Laboratory, nces Risborough, Bucks.]

After outlining the ways in which wood differs entially in structure from other industrial raw terials, the author describes the properties and uses various timbers of British and foreign origin. Soft- ods are less numerous than hardwoods, are more form in structure and properties, and hence have a rower range of uses. They are for the most part, neral purpose woods, used in carpentry and joinery, the manufacture of boxes and crates, and similar poses. With a few exceptions, of which examples given, they have no individual outstanding proper- s. Hardwoods, on the other hand, are more diverse structure and have many more uses. The good aving properties of some are described with reference the special uses for cleft or riven wood on account its superior strength. The hygroscopicity of other ods is noted, with descriptions of the mechanical which has been made of this property. Hardwoods ecifically dealt with are Oak, Chestnut, Ash, Elm, lsa, Willow, Poplar, Alder and Lime.

33.06. Fuelwood (including Firewood, Charcoal Wood, and Producer Wood)

06 : 07.7. GLÄSER, H. Die Aufbereitung von neratorholz. **[The preparation of producer fuelwood.]** lz 6, 1943 (198–203). [G.] [Technische Zentralstelle deutschen Forstwirtshaft.] P.R.

Included is a list of the machines used in the different ocesses of preparing producer fuelwood, indicating manufacturers, capacity, power consumption, and ce of each machine.

33.1. *Mechanical Conversion, excluding the Manufacture of Mechanical Pulp*

33.12. Furniture and Cabinet Making

.12. GRAY, W. E. **Woods for sculpture.** *Wood* 9, 44 (51–6).

33.15. Manufacture of Veneers and Laminated Wood. Gluing

.15. **New development in gluing of wood.** *Sth. mberm.* 167 (2105), 1943 (144).

A new technique has been developed by which stic glues used in wood laminations are hardened d brought to full strength in a matter of a few nutes. The process involves adding to the glue a emical that will make it a good conductor, and applying an electric current to the glue film between laminations.

33.15. **Scarfed joints.** *Aircraft Prod.* 5, 1943 (552–4).

Limitations in plywood presses and veneer-producing machines make the scarfing of plywood panels unavoidable. The types of scarf joint used, and various methods for cutting the bevel and making the joint, are concisely described.

33.15. BERLINER, J. F. T. **Methylolurea-treated wood: preliminary outline.** *Sth. Lumberm.* 167 (2105), 1943 (140–1).

The properties of resinified wood are discussed and a brief account is given of the process involved in its production through the impregnation of wood with resin-forming chemicals, and of the equipment and chemicals required in this process.

33.15. BRUSON, H. A., and RAINEY, J. L. (The Resinous Products and Chemical Co.) **Adhesives suitable for use with various materials, as in bonding plywood.** *U.S. Patent* No. 2,325,105, July 27, 1943. Chem. Abstr. 38 (187). P.R.

A solution of a condensate of a bisthioammeline ether and CH_2O is used with an acidic condensation catalyst for hardening the condensate, and with 'soluble blood' or various other admixtures. Numerous examples with details are given.

33.15. BRUYNE, N. A. DE. **The strength of glued joints.** *Aircraft Engng.* 16 (182), 1944 (115–8).

This analysis of the stresses in glued joints, though applied to joints between metals, is equally applicable to joints in wood and other materials.

33.15. DIETZ, A. G., and GRINSFELDER, H. **Behaviour of synthetic phenolic resin adhesives in plywood under alternating stresses.** *Repr.* from *Amer. Soc. Mech. Engrs.* 1943. pp. 15.

33.15. GALLAY, W., and GRAHAM, G. G. **A new gluing process.** *Mod. Plastics* 21 (6), 1944 (126–9, 168, 170, 172).

A description of a new process for curing synthetic resin glue films involving the passing of electrical current through the film, which is rendered conductive by adding acetylene black to the glue. Details of power required, time saving, simplicity and possible applications are included. See also *Aircraft Prod.* 6 (67), 1944 (210–11).

33.15. GRINSFELDER, H., and COLLINS, M. R. **Plywood bonding.** *Industr. Engng. Chem.* (*Industr. Ed.*) 36, 1944 (152–7). [Resinous Products and Chemical Co., Philadelphia.] P.R.

A method is described for determining a minimum bonding time schedule that is applicable to a wide variety of plywood constructions and bonding conditions.

33.15. HANRHAN, F. J. **Glued laminated lumber construction.** *Repr.* from *Amer. Soc. Mech. Engrs.* 1943. pp. 9. Also *Mech. Engng.* 65 (12), 1943 (188).

33.15. JERVIS, A. E. L. **Laminated wood as an insulator.** *Electron. Engng.* 16 (192), 1944 (365–8). [Corrections in 16 (193), 1944 (431).]

The advantages of 'resin impregnated laminated and compressed' wood for use as an insulating material are outlined in general terms and detailed descriptions of (1) 'fish plates', (2) 'fuse extractors', (3) 'insulators for H.T. cables', and (4) stay rods, are given to illustrate its

versatility. A note is given on a paper on high-frequency heating by J. P. Taylor [cf. *For. Abstr.* 5 (267)], and examples are worked out. The article concludes with a table of average mechanical and electrical properties of the treated wood.

33.15. KEYSER, P. V., and SPELSHOUSE, W. E. (to Socony-Vacuum Oil Co.) **Laminating wood plies.** *U.S. Patent* No. 2,290,833, July 21, 1943. Chem. Abstr. 37 (489). P.R.

Use is made of an adhesive comprising an oxidized petroleum asphalt of a melting point of at least about 225° F., 5–25 per cent. of a microcrystalline petroleum wax, and 10–35 per cent. of a compatible resinous material such as wood rosin or hydrocarbon resins derived from petroleum and coal tar.

33.15. MACKINNAY, H. W., and REPSTER, L. **The spreader method for the manufacture of impregnated wood.** *Mod. Plastics* 21 (7), 1944 (103–5, 166–7).

The limitations of the present European and American methods of applying resin to the veneers prior to pressing them into boards are outlined, and a new process is described. This involves applying the resin to a dry veneer on a conventional glue spreader, drying the glue film (optional), and forcing the resin into the veneer during the compression and curing process.

33.15. MENGER, A., and BOCK, E. (vested in the Alien Property Custodian). **Use of glue, dextrin, synthetic resins or other adhesives for uniting wood veneers, leather, textiles, pasteboard or other materials.** *U.S. Patent* No. 2,323,831, July 6, 1943. Chem. Abstr. 38 (188). P.R.

An adhesive is applied in the form of a liquid foam to surfaces which are then united by heat and pressure, as at 90–100° under a pressure of about 10 atm. Various examples with details are given.

33.15. NICHOLS, W. H. **Plywood and plastics.** *Flight* 45, 1944 (371–4).

Cf. *For. Abstr.* 5 (187). The Thadex method of producing curved plywood is described; the process combines the advantages of the autoclave method with the cheapness of the wooden press method. The possibilities and disadvantages of the use of high frequency power for curing synthetic resin glues are briefly described. Some details are given of the Gallay Process, which depends on the passage of direct current through an 'acetylene black' dispersion in the glue film; details of the voltages, etc. required for various sizes of joint are given.

33.15. SMITH, I. C. **Resin glues least publicised form of 'plastics'.** *B.C. Lumberm.* 27 (9), 1943 (63-4).

The characteristics of three classes of synthetic resin glues—urea-formaldehyde, phenol-formaldehyde, and melamine resin glues—are given briefly.

33.15. TREVOR, J. S. **High duty woods.** *Aeronautics* 9 (6), 1944. pp. 32.

The types and properties of laminated, compressed, and resin impregnated woods are divided into four main sections, those suitable for (1) airscrews, (2) structural components, (3) tools, and (4) electrical appliances. The first section is dealt with in detail, and a short note is given on each of the other three.

33.15 : 07.7. **New method of cutting plywood patches.** *W. Cst. Lumberm.* 70 (10), 1943 (66).

A brief illustrated description of a new machine that cuts plywood patches of uniform size and shape at the rate of 27 per minute.

33.15 : 07.7. TAYLOR, J. P. **A radio-frequency gun for spot-gluing wood.** *Electronics* Nov. 1943 (106–11, 310). L.S.

Details of construction and the principle and method of operation are given for a device known as a 'radio-frequency gun', by which high-frequency heating is applied in order to spot-glue veneer layers in the early stages of plywood construction and thus hold them in position preparatory to final bonding and moulding.

33.15 : 12.26–8 : 31.27. ROSTLER, G. **Stress–strain in compression of resin-bonded plywoods.** *Brit. Plastics* 14, 1943 (534). [U.S.A. Plastics Institute.] L.S.

Laminates made from 0·04-in. Birch and Poplar veneers were tested in a universal testing machine and load deformation characteristics were observed. From the results, which are tabulated, it is concluded that the mechanical properties of plastics are improved by the use of relatively high laminating pressures.

33.15 : 31.27 : 38.2. **Strength of nailed plywood joints subjected to lateral loading.** *Engng. News-Rec.* 130, 1943 (691–3). L.S.

Tests were made of plywood of different thicknesses to determine the relative strength of joints using nails of various sizes. Materials and conditions of the tests conformed closely to usual field practice, and results indicate that a factor of safety of about 5 is permissible.

33.15 : 31.27. ROBERTS, H. **The elasticity of plywood.** *Aircraft Engng.* 16 (181), 1944 (68–72 + figs.)

Having assumed: (1) that the individual veneers act as homogeneous plates, (2) that the stress through individual veneers is constant, and (3) that all veneers have the same deflection, the relation between the following properties and the grain angle is mathematically derived: (*a*) Young's modulus, (*b*) the modulus of rigidity, (*c*) Poissons ratio, (*d*) the critical buckling stress for panels.

33.15 : 33.8. LARSSEN, B. H. **Plywood panels.** *Canad. Aviation* 17 (2), 1944 (78, 80).

The 'Hollo Tech' floor (made by Technical Plywoods) is less than ¾ in. thick, it weighs about 0·85 lb./sq. ft. and will support an ultimate load of 800 lb./sq. ft. Resistance to highly concentrated loads, such as chair legs, castors, etc., has been proved satisfactory by test. Panels 25 ft. × 4 ft. are now being made.

33.15 : 33.8. NEBESAR, R. J. **Veneers in aircraft construction.** *Wood* 8, 1943 (175–9).

A general discussion with special reference to the use of synthetic resin glues and modern moulding processes.

33.17. Sawmilling

33.17 : 07.7. HAYCOCK, A. H. **Log conversion.** *Wood* 8, 1943 (165–6, 191–2, 239–41).

The article discusses the maintenance of saws, and the uses, advantages and disadvantages of circular saws, band saws, and frame saws.

33.17 : 07.7. IHLENFELDT. Schutzvorrichtungen an Kreissägen. [**Safety devices on circular saws.**] *Dtsch. Holzbau* 3, 1943 (183–5). [G.]

The regulations governing the use of riving knives and guards for circular saws are described in some

detail. Various methods of fixing and adjusting these devices are described and illustrated.

33.17 (66.9) : 98.1. LOWSLEY, L. **Timber production in Nigeria.** *Wood* 8, 1943 (170–3).

An illustrated note on sawmilling in Nigeria.

33.17 (71.3–7) : 76.1. PRINCE, J. B., and FELLOWS, E. S. **Cost of sawing Eastern Spruce lumber.** Forest Products Laboratories, Dominion Forest Service, Ottawa, Canada. 1943. pp. 3 + tbl.

From a study of sawmill operations in eastern Canada evidence was obtained in support of the theory that lumber from small logs is more expensive than that from large ones. In this study costs included all primary milling costs and the direct labour costs involved in power-house, power production, and maintenance. Labour costs for sawing 1,000 bd. ft. of lumber from logs of different diameters are tabulated for different types of saw.

33.19. Other Forms of Mechanical Conversion

33.19. **The bending of solid timber.** *Leafl. For. Prod. Res. Lab.* No. 23, 1943. pp. 12.

An outline of the principles and methods of bending solid timber. A table is included giving for a number of species the approximate radius of curvature at which losses due to breakages should not exceed ·5 per cent. of the pieces bent.

33.3. *Chemical Treatment*

33.3 : 98.2. BERLINER, J. F. T. **The chemist and the lumber industry.** *Timber of Canada* 4 (6), 1944 (32–4, 76–7).

This conference paper deals briefly with the various aspects of the chemical treatment of wood, with particular reference to chemical seasoning and wood impregnation.

33.32. Pulp and Paper Manufacture. Plastics

33.32. KLINE, G. M. **Plastics.** *Publ. Smithsonian Inst., Wash.* No. 3659, 1942 (225–38 + plates). From *Smithsonian Rep.* for 1941. [U.S. National Bureau of Standards.]

An account is given of the scope of the plastics industry and of the history of the development of plastics in the United States, with a summary of the progress made in 1940.

33.32 (7 : 4). HALPERN, D. B. **III—Raw materials for rayon. Wood pulp industry in North America. IV—Raw materials for rayon. Wood pulp in northern Europe.** *Times Tr. Engng.* 54 (957; 958) (*n.s.*), 1943 (9; 5, 23). P.O.

This article includes a brief account of the principal firms in Europe and North America that produce wood pulp for use in rayon manufacture.

33.32 : 12.25. **Steering with Redwood wheels.** *Mod. Plastics* 20 (5), 1943 (77–81, 136). P.O.

Redwood (*Sequoia sempervirens*) plastic pulps, made by cooking Redwood chips with steam at high pressure for a period of seconds followed by a sudden release of steam pressure, are moulded directly into articles such as steering wheels, the production of which is described in this article. The moulded pieces have tensile values of 5,000 to 6,000 lb./sq. in., notched Charpy impacts of 0·50, and flexural values of 7,000 to 7,500 lb.

33.32 : 12.25 : 31.27. KLAUDITZ, W. **Zur Technologie verholzter pflanzlicher Zellwände. Untersuchungen über die Zugfestigkeit von Papieren aus Fichten-Sulfitzellstoffen. [On the technology of lignified plant cell walls. Investigations on the tensile strength of paper made from Spruce sulphite pulp.]** *Papierfabrikant* No. 7, 1943 (247–58). [G.g.] [Chemisch-technologisches Institut der Reichsanstalt für Holzforschung, Eberswalde.] P.R.

The relationships between the tensile strength of Spruce wood and that of paper manufactured from Spruce sulphite pulp are discussed. The tensile strength obtained in the practical manufacture of such paper is not more than about 61·5 per cent. of that obtained in the laboratory under favourable conditions.

33.32 : 33.02 : 12.25. OSTROWSKI, H. J. **Wood influence on pulp quality; experimental work with Fir and Spruce under varying conditions.** *Pulp Paper Mag. Can.* 44, 1943 (807–9).

Results from tests under mill and experimental conditions showed that generally sulphite pulp from Balsam Fir (*Abies balsamea*) gave higher burst factors than that from Spruce (*Picea* spp.), and that the use of stained wood and knots resulted in a pulp of inferior grade in strength qualities, bleachability, brightness and dirt count.

33.32 : 12.25–8. MARTIN, J. S. **Sulfate pulping of mixtures of selected southern hardwoods, Southern Yellow Pine.** *Sth. Pulp Paper J.* 6 (7), 1943–44 (13–8). [U.S. Forest Products Laboratory, Madison, Wis.]

Southern Yellow Pine was mixed in equal proportions by weight with each of the southern hardwoods Sugarberry (*Celtis laevigata*), Green Ash (*Fraxinus pennsylvanica lanceolata*), Southern Cottonwood (*Populus deltoides virginiana*), Bitter Pecan (*Carya* [=*Hicoria*] *texana*), American Elm (*Ulmus americana*), Black Willow (*Salix nigra*), and Sweet Gum (*Liquidambar styraciflua*), the mixtures were pulped experimentally and the pulps converted to liner boards.

Bitter Pecan was outstanding in volume production, it being estimated from the data available that the Bitter Pecan/Pine mixture would give nearly 14 per cent. more pulp per cord than any of the other hardwood/Pine mixtures.

Strength properties of the pulps from each of the mixtures, other than the Willow/Pine mixture, fell within a fairly narrow range and were generally a little lower than those obtained from the Pine pulp alone. The Willow/Pine pulp mixture was equal to or better than the Pine pulp in most strength properties, and was outstanding in chemical purity, unbleached and bleached colours, and bursting and tensile strengths.

In most cases the liner boards made from the hardwood/Pine pulp mixtures compared reasonably well with the boards made from Southern Yellow Pine alone, and experimental data indicate that up to 50 per cent. of southern hardwood can be substituted for Southern Yellow Pine for the production of a sulphate pulp suitable for 16-point liner board. Rated on the relative properties of the boards, Sugarberry, Willow and Ash gave the best results, Bitter Pecan and Sweet Gum intermediate, and Elm and Cottonwood gave less satisfactory results.

33.32 : 31.3. DÖRR, R. E. **Wood pulp: composition and properties.** *Angew. Chem.* 53, 1940 (292–9). [G.]

Brit. Chem. Physiol. Abstr. B II, 1943 (37). Brit. Cotton Ind. Res. Ass. Summ. 24, 1944 (102).

The consituents (contents of α-, β- and γ-cellulose, hemi-cellulose, lignin, resin, ash, and, after hydrolysis, glucose, mannose and xylose) and physical properties (viscosity, degree of polymerization, swelling, copper number, etc.) of woods, wood pulps, and straw are diagrammatically represented and discussed with reference to their bearing on the quality of derived viscoses.

33.32 (410) : 34.6. DONNELLY, G. V. **Pulp production in post-war Britain: wood-waste.** *Proc. Papermakrs'. Ass. G.B.I.* 46 [1943?] (6–7). I.F.B.

The principal types of wood waste and their suitability for pulp manufacture are discussed. On account of the labour shortage the sawmills are unable to undertake sorting and barking of the wood as required by the pulp mills, but there is a possibility that after the war this could be undertaken provided the pulp mills were prepared to pay the extra cost entailed. Fuel merchants compete with the mills for the same material without demanding the extra processing, and will also take types of wood not favoured by the pulp industry. Any conifers now remaining in Britain are of a size eminently suitable for pitprops or to be reserved for the future growth of saw timber; of hardwoods the greatest proportion is in Oak, which is not favoured by pulp producers. The present maximum controlled price for fuelwood makes it uneconomical to extract this material, and it is suggested that if the paper industry could offer higher prices considerable quantities might be made available.

Afforestation schemes should aim to supply the paper industry, and the timber trade could take on felling, extraction and primary processing of wood with this end in view. There is a possibility that post-war imports will tend towards finished products rather than raw materials; this would give less sawmill waste for pulp mills and probably less imported pulpwood.

33.32 (410) : 98.1. ROBERTSON, W. A. **Pulp production in post-war Britain: home-grown timber.** *Proc. Papermakrs'. Ass. G.B.I.* 46 [1943?] (2). [Forest Products Research Laboratory, Princes Risborough, Bucks.] I.F.B.

Very little home-grown pulpwood is to be expected during the first ten years after the war. For the first twenty years supplies must come from thinnings of young plantations, and will be of small diameter with an unduly large proportion of bark and therefore limited in use. Points to consider with reference to the second twenty years are: (1) the maximum economic distance from the mill over which pulpwood can be brought by road or rail, and (2) the minimum economic unit for a mill. Putting the first at 30 miles by road and the second at 30,000 tons input of raw timber per annum, only three or four main areas in Great Britain will be able to meet these conditions. Otherwise there will be substantial areas of forest but its availability to the pulp mills will depend on the amount per ton-mile the mill can afford to pay for its supplies of timber.

33.32 (73) : 98.1 : 12.25–8. MCGOVERN, J. N., and MCGREGOR, G. H. **Sulfite pulp production: some factors pertinent to meeting war born shortages.** *Pulp Paper Mag. Can.* 45, 1944 (74–81).

The prospect of a serious shortage of sulphite pulp in 1944 prompted the Forest Products Laboratory, Madison, to survey ways and means of increasing pulp production under existing conditions. It is suggested that the less common pulpwood species together with logging, sawmill, and veneer-mill wastes be utilized to the full extent of their availability; that advantage be taken of dense woods giving high yield per volume; that the pulping process be conducted in conformity with principles resulting in maximum production; and that fibre losses from chip preparation and pulp treatment and bleaching be minimised. The paper discusses briefly the pulping procedures applicable to species less commonly used for sulphite pulping, including Aspen, Cottonwood, Birch, Maple, Gum, Beech, Northern Pines, Tamarack, Western Pine, Larch, Douglas Fir, Southern Pine, Western Red Cedar, Sitka Spruce, and Alder, and examines in detail the sulphite process variables affecting pulp production. General observations are made on methods of reducing fibre losses due to different causes. *From authors' summary.*

33.36. Preservation of Wood. Seasoning and Drying

33.36.1. *Preservation against Attack by Plants and Animals*

33.36.1. **Report of Special Committee on painting creosoted wood.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (89–91 + tbls.).

Results of field trials with selected paint types are tabulated. The data are grouped according to the condition of the wood surface at the time of application, whether wet or moist with creosote, or dry.

33.36.1 (71 : 72 : 73). **Wood-preserving plants in United States, Canada and Mexico.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (190–9).

33.36.1. LEUTRITZ, J. **Outdoor tests of wood preservatives.** *Bell Lab. Rec.* (*Overseas Ed.*) 22, 1943 (179–82). L.S.

A brief account is given of the selection and treatment of wood specimens to be tested, and of the arrangement and analysis of field-exposure tests. Greensalt appears to be one of the most promising of the salt-type wood preservatives [cf. *For. Abstr.* 4 (177, 178)].

33.36.1. WAGNER, H. **Plaster and wood treatment with paint.** *Farbenztg.* 48, 1943 (61–3). Chem. Abstr. 38 (497). P.R.

The physical and chemical principles applying to the protection of wood and plaster surfaces with paints are discussed.

33.36.1 : 12.25. BUCKMAN, S. J., PERA, J. D., and BROWNE, R. Y. **Non-pressure treatment of wood. II. Soaking treatment of preheated Southern Pine sapwood with a low viscosity oil solution of pentachlorphenol.** *Sth. Lumberm.* 167 (2105), 1943 (156–8).

Specimens of Southern Pine sapwood 2 × 6 in. and 1 ft. long, having average moisture contents of 16·8–21·0 per cent., were preheated at different temperatures for 2 hours and then soaked in a low viscosity oil solution of pentachlorphenol at 80° F. for various periods of time and at different depths of immersion [cf. *For. Abstr.* 4 (238)]. The effect of these variables on absorption and penetration of the preservative is shown in the following table.

Temperature to which wood was pretreated	*Average depth of immersion ft.*	*Average preservative absorption in lb. per cu. ft. after soaking for the following periods of time*				*Percentage of specimens with complete penetration after soaking for the following periods of time*	
		0·5 *hr.*	2·0 *hr.*	6·0 *hr.*	24·0 *hr.*	0·5 *hr.*	24·0 *hr.*
80°F.	1	—	1·4	1·8	2·5	—	100
80	4	1·9	—	—	—	65	—
80	7	—	3·4	4·4	5·0	—	100
130	4	2·6	4·5	6·0	7·3	90	100
180	1	—	9·7	12·7	14·5	—	100
180	4	5·1	11·7	14·0	15·5	100	100
180	7	—	13·8	15·8	17·3	—	100
230	1	—	16·5	20·8	22·6	—	100
230	4	11·8	18·4	21·6	23·0	100	100
230	7	—	19·8	22·0	23·0	—	100

33.36.1 : 31.43 : 13.2. HUNT, G. M., and SNYDER, T. E. **An international termite exposure test, fourteenth progress report.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (74–89).

33.36.1 : 33.12. **Report of Committee 7–11—uses of treated wood for car lumber.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (145–9).

Report of recent additions to the list of those railways using treated car lumber, and of service records for treated material.

33.36.1 : 33.31. **Report of Committee 4—preservatives.** With discussion. *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (17–36).

As recommended in the 1942 report [cf. *For. Abstr.* 4 (177–8)], specifications for the preservatives chromated zinc chloride, tanalith, and zinc meta-arsenite are presented and accepted as tentative standards.

Methods are described for analysing the materials used in standard salt preservatives, and for determining the penetration of these preservatives.

33.36.1 : 33.31. ARNOLD, W. P., and BOLLER, E. R. (to E. I. du Pont de Nemours and Co.). **Preservative compositions suitable for use in aqueous solution for impregnating wood.** *U.S. Patent* No. 2,325,359, July 27, 1943. Chem. Abstr. 38 (468). P.R.

A mixture is used which may contain $ZnCl_2$ 70–85, $CuCl_2$ 3–29, and As_2O_5 1–2 per cent., together with $Na_2Cr_2O_7$.

33.36.1 : 33.31. AZEVEDO, P. DA R. **Use of creosote in preservation of wood.** *An. Ass. Quím. Brasil* No. 2, 1943 (97–108). Brit. Chem. Physiol. Abstr. B I, 1944 (60). P.R.

Creosote from which tar acids have been removed is an efficient wood preservative. Gas oil, even with added tar acids up to 8 per cent. of PhOH, is useless for the purpose.

33.36.1 : 33.31 (73) : 09.4. HELPHENSTINE, R. K. **Quantity of wood treated and preservatives used in the United States in 1942.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (162–88 + tbls.).

Data are given on the distribution, class and type of treating plants in the United States, the consumption of preservatives, the range of prices paid for preservatives (1941–42), the quantities of domestic and imported creosote used (1909–42), and the preservatives used and materials treated during 1941–42.

33.36.1 : 33.31. ZIMMER, F. **Wood-finishing lacquers from resins and from nitrocellulose plus artificial resins.** *Farbenztg.* 47, 1942 (53–4). *Chem. Zbl.* II, 1942 (463). Chem. Abstr. 38 (268). P.R.

33.36.1 : 33.4 : 33.52 : 12.26–8. **Report of Committee 5–1 — Oak ties and lumber, pressure treatment.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (38–9).

Recommendations are made for the minimum retentions of zinc chloride, creosote, and creosote-coal tar mixtures required for the preservative treatment of Red and White Oak.

33.36.1 : 33.4 : 38.2. **Report of Committee 7–10 — diversified uses of treated wood.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (136–45).

In a proposed revision of A. W. P. A. Standard 50b, which is accepted as a tentative standard, it is recommended that, for protection against decay and subterranean termites, building members in contact with the ground should be pressure-treated with coal-tar creosote by the empty-cell process with a net retention of not less than 8 lb./cu. ft., and members not in contact with the ground, up to and including the first-floor subfloor and higher where necessary, and nailing strips should be pressure-treated with coal-tar creosote (8 lb./cu. ft. and 6 lb./cu. ft., respectively) or with an approved toxic salt, the net retention per cu. ft. being specified for each salt. Cut surfaces exposed after treatment should be well coated with the preservative, and before installation salt-treated material should be seasoned to the moisture content approximating conditions in use.

Notes and illustrations are given on new and previously reported miscellaneous treated-wood products, and on the distribution of pressure-treated wood in the southwestern States.

33.36.1 : 33.52. **Report of Committee 7–1 — tie service records.** With discussion. *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (92–110).

Records are given for two test tracks of sleepers representing a variety of species, preservative treatments and service periods.

33.36.1 : 33.52 : 33.4 : 12.25. **Report of Committee 5–2 —Southern Pine ties and lumber, pressure treatment.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (41).

Standard Specification (53a) for the preservative treatment of Southern Pine ties and lumber by pressure processes is approved, with certain recommended changes, as a tentative standard for another year [cf. *For. Abstr.* 4 (178)].

33.36.1 : 33.53. **Report of Committee 7–4–1 — marine piling service records.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (111–24).

Performance records are discussed for creosote-treated piling used in harbour structures on the Pacific coast of the United States, and also of mineralized-cell-treated piles used in structures exposed and in those not exposed to marine borers.

33.36.1 : 33.53 : 12.25. **Report of Committee 5–5–1 — poles, pressure treatment.** With discussion. *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (43–53).

Details are given of a tentative standard specification for the pressure treatment of Western Red Cedar (*Thuja plicata*) poles. Unless otherwise specified the preservative to be used shall be either creosote or creosote-coal tar solution of a standard to conform to the A.W.P.A. specifications, the retention of the preservative in each case to be not less than 4 lb./cu. ft. Whenever possible the poles are to be treated by an empty-cell process, and penetration of preservative is to be not less than 90 per cent. of the sapwood thickness.

Examples are given of the use of treated wooden poles in place of iron and steel installations in the building of electric substations and in high tension units.

33.36.1 : 33.53 : 12.25. **Report of Committee 7–7 — pole service records.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (124–31 + tbl.).

Data are given on the service records of pole installations representing various species and preservative treatments.

33.36.1 : 33.53 : 12.25–8. **Report of Committee 5–5–2 — poles, non-pressure treatment.** With discussion. *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (53–7).

A list is given of the timber species that have been treated by each of seven different methods of ground-line preservation [cf. *For. Abstr.*, 4 (179)].

33.36.1 : 33.54. **Report of Committee 7–9 — post service records.** *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (132–6).

Service records are given for test posts that have been treated with various preservatives, particularly borax, borax–boric acid, chlorinated phenols and other materials that have been specified for war work.

33.36.1 : 52.43.2. **Report of Committee 5–9 — inspection.** With appendix and discussion. *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (57–65).

In connexion with the revision of Standard 14b—Standard Volumes of Piles and Poles—volumes of piles and poles given in this Standard are compared with those determined by direct measurement and by various methods in commercial use. The volumes for different species are tabulated by localities and length classes.

A small change is proposed in preliminary Standard 33c—Standard Instructions for the Inspection of Preservative Treatments of Wood—to cover the definition of 'refusal' in the preservative treatment of all species.

33.36.2. *Fireproofing*

33.36.2. **Report of Committee 9 — fireproofing.** With discussion. *Proc. Amer. Wood-Pres. Ass.* 39, 1943 (150–5).

This report includes a discussion of a number of specifications for the pressure fire-retardant treatment of wood which are under consideration by the Committee.

33.36.2. KUMMERER, L., and KOLB, H. **Die chemische Nachprüfung der Feuerschutzimprägnierung von Dachstühlen. [Chemical testing to check the fireproof condition of treated roof timbers.]** *Holz* 6, 1943 (203–5). [G.g.]

By means of a borer, samples are taken from treated timbers and analysed for the content of sulphates, phosphates or zinc. Such determinations make possible an estimate of the extent to which roof timbers are impregnated with the protective substance at a given time.

33.36.2 : 33.15. JONES, N. C. **The fireproofing of wood.** *Chem. & Ind.* No. 11, 1944 (98–9). P.R.

The methods used in fireproofing wood are (1) surface coating, and (2) impregnation with fire-retarding chemicals either by immersion or pressure treatment. Materials suitable for application by these methods are discussed and two methods of testing the fire resistance of wood are described briefly. It is pointed out that fireproofing agents may affect the strength of glued joints; vegetable and casein glues are liable to be affected by most preparations while animal glues are more resistant.

33.36.2 : 33.31. **Fire-resistant wood for railway buildings.** *Wood Pres. News* 22, 1944 (24–6, 31–4). P.R.

In these excerpts from a report of Committee 6 of the American Railway Engineering Association, presented at the annual meeting, 1944, reference is made to the qualities of various building materials in relation to fire hazard, to performance test requirements for fireproofing wood, and to certain current specifications relating to fire tests of wood and wood construction.

A specification for the fire-resistive treatment of timbers and lumber is presented by the Committee for the consideration of the Association.

33.36.3. *Seasoning. Drying*

33.36.3. **Seasoning of timber—use of urea.** *Civ. Engng.* 38, 1943 (188).

33.36.3 : 07.7. **General observations on the design of timber-drying kilns.** *Leafl. For. Prod. Res. Lab.* No. 30, 1943. pp. 6.

The information presented in this leaflet deals with size of kiln, double stack pattern and single stack pattern kilns, heating systems, control instruments, and loading and unloading facilities.

33.36.3 : 11.14 : 07.7. HODGE, R. E. **Hygrometers in kilns.** *Wood* 8, 1943 (270). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

Note on the use and maintainence of hygrometers in kilns.

33.36.3 (41.5) : 31.22.1 : 32.26. **Handling native timber.** *Irish For.* 1 (1), 1943 (20–4).

An outline of the principles governing air seasoning and kiln drying of timber. Instructions are given for handling logs after felling, piling sawn material and the determination of moisture content, and, in addition, there are explanations of the factors regulating the time required for drying in an overhead fan-driven kiln, viz. original and final moisture contents, density of timber, thickness of stock, air temperature, relative air humidity, velocity of air currents and length of air travel.

33.37. Distillation. Manufacture of Tar

33.37. LAMBIOTTE, A. **Continuous carbonization and destructive distillation of cellulosic materials such as**

wood. *U.S. Patent* No. 2,289,917, July 14, 1943. Chem. Abstr. 37 (516). P.R.

An arrangement of apparatus is described, and a process is employed in which heat is carefully regulated for the production of HOAc and MeOH, which involves passing the material to be carbonized through a chamber, introducing inert gases heated to between about 300° and 600° from the outside directly into the chamber at an intermediate point thereof to cause a carbonizing zone to form in the chamber in the vicinity of the point, introducing inert gases at a temperature under about 40° into the chamber near the discharge end thereof, causing the hot and cold inert gases to travel through the chamber in contracurrent to the material, controlling the rate of travel of the material and the rates of flow of the hot and cold inert gases to produce a carbonizing zone in the retort located beyond and having its beginning immediately beyond the point of introduction of hot inert gases in the direction of travel of the material, withdrawing the inert gases from the chamber together with the HOAc and MeOH at a temperature of at least 100°, and separating the HOAc and MeOH from the inert gases.

33.38. Charcoal Manufacture. Use of Wood and Charcoal in Producer-Gas Generators

33.38.1 : 07.7. En modern kolningsanläggning för stubbved. [**A modern charcoal-burning plant for stump wood.**] *Skogsägaren* 18, 1942 (145–8). [Sw.]

The construction of the plant is described. Yield varies according to quality of stump wood used, an average yield from 1 cu. m. dry wood, stacked measure, being 30–40 kg. tar, 8 kg. crude turpentine, 6 kg. tar oil, and 5 hl. of charcoal. Analyses show the products obtained to be of good quality.

Best results are obtained by using Pine stumps that have been left for 30 to 40 years after felling. As a rule large stumps are better than small ones.

A single plant can deal with 16,000 cu. m., stacked measure of coarsely split stumps per year. R. P. J.

33.38.1 : 07.7. En transportable finsk kolugn. [**A portable Finnish charcoal kiln.**] *Skogsägaren* 18, 1942 (29–30). [Sw.]

The IDO kiln is a light metal kiln, conical in shape, that has a capacity of about 2½ cu. m. of wood. In tests 5·2 hl. of motor charcoal and 5 kg. of thick tar were obtained per cu. m. of split Birch billets 1 m. long. Thin, unsplit Birch gave 4·6 hl. of charcoal and 3·8 kg. of thick tar. Similar or even better results may be obtained by using wood of other broadleaved species.

The burning operation requires 8–10 hours, depending on the quality of the wood. The period of cooling can be shortened to 3–4 hours by introducing steam vapour into the kiln. The glowing charcoal is quickly extinguished, and the vapour causes the charcoal to break in pieces so that crushing is facilitated. R. P. J.

33.38.2 (68.9) : 12.26–8. NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1942.** Govt. Printer, Zomba. 1943. pp. 15.

Three methods of charcoal burning have been tried out in Nyasaland:—(1) An empty oil drum was used successfully as a kiln for carbonizing small pieces of wood. (2) The pit method was used frequently and can be recommended where fuel supplies are scattered. It was found that in many soils it was unnecessary to line the pits with brick. (3) A small brick kiln built to specifications published by the Fuel Research Institute of South Africa was found to be simple to operate and most economical, 1 cu. yd. of fuel yielding an average of 140 lb. of charcoal (p. 9).

Various species of wood were tested for charcoal production, good results being obtained with *Copaifera mopane* and *Brachystegia floribunda*. However, the charcoal most suitable for use with the type of producer unit being imported into Nyasaland was made from discarded corn cobs (p. 10).

33.38.2 (44). DELPEYRON, J. **The French gas producer industry.** *Tech. mod.* 35 (15/16), 1943.

The French Producer Gas Committee recently set up is divided into 10 groups each of which is charged with the development of a standard design for automobile producer-gas units of one type. Production of non-standard units is prohibited after acceptance of the standard design for the type. Up to August, 1943, nine standard designs using wood fuel had been accepted; details and sketches of six of these are given. See also *Engrs. Dig.* 5 (2), 1944.

33.39. Manufacture of Sugar, Oils, Alcohol, and Vinegar from Wood

33.39. FERRARI, D., and TORRESI, M. (vested in the Alien Property Custodian). **Saccharifying wood meal.** *U.S. Patent* No. 2,323,022, June 29, 1943. Chem. Abstr. 38 (253). P.R.

A process is employed which involves agitating wood meal, or that formed from crushed straw, for about a half hour while very slowly adding to it about 15 per cent. by weight of 60° Bé. H_2SO_4, diluting the resulting mixture with four times its weight of water, cooking the diluted mixture for 15 minutes under 3–4 atm. pressure, extracting the furfurol and HOAc, separating the sugar-containing liquid from the solid parts of the mixture, drying the solid residuum and retaining it for about 8–10 hours in a maturation chest at a temperature of about 100°, grinding the maturated material under very high pressure for about 2 hours while gradually admixing with it about 66·6–75 per cent. by weight of 60° Bé. H_2SO_4, diluting the black paste obtained with twice its weight of water, cooking the mixture for 15 minutes under a pressure of 3–4 atm. and filtering the resulting creamy liquid to separate the sugar-containing liquid from the solid lignin residuum.

33.5. *Pitprops. Sleepers. Poles and Other Roughly Converted Wood*

33.51 : 98.2 (410). ALDRIDGE, C. **Should Britain produce pitprops in peacetime?** *Timb. & Plyw.* 86, 1944 (438, 454, 456). P.R.

It is pointed out that with the possible rapid extension of Crown forests and the regrowth on cut-over areas after the war, there will in time be ample quantities of material to support a permanent pitprop industry in Britain. Furthermore, as the amount of mature timber in the country immediately after the war will be very limited, the trade will have to extend its work to other branches of industry, such as the marketing of mine timbers.

Among the problems that would have to be considered in attempting to establish a home-grown prop industry would be: (*a*) competition of the Scandinavian and Baltic product; (*b*) cost of transportation by rail; (*c*) the marketing of props.

33.53 : 12.26–8. WIMBUSH, S. H. **Saligna Gum poles.** *E. Afr. agric. J.* 9, 1944 (156).

Saligna Gum (*Eucalyptus saligna*) does not make a good pole owing to its tendency to split. This is reduced if the trees are left with foliage intact for at least two months after felling in order to facilitate drying; binding the ends of the poles with wire also helps to prevent splitting. This method gives a reasonably sound pole. In addition, the lighter weight after drying makes the pole easier to handle.

33.6. *Packing Boxes, Crates, etc.*

33.6 : 12.25–8 (77.4). VOGEL, F. H. **Use of native Michigan timber in the box and crate industry.** *Spec. Bull. Mich. agric. Exp. Sta.* No. 323, 1943. pp. 43.

A general account. The bulletin contains a list of Michigan manufacturers of wooden containers, indicating the products manufactured by each.

33.6 : 12.25. WATSON, C. J. J., and MOORE, D. **The suitability of thinnings of *Pinus taeda* and *P. caribaea* for pineapple cases.** *Adv. Leafl. Qd. For. Serv.* No. 4 [n.d.] pp. 7.

The wood properties of thinnings of *Pinus taeda* and *P. caribaea* grown at Beerwah [South Queensland] are considered in relation to the general requirements of a fruit-case timber. The fast-grown thinnings were found to be comparatively light, and the properties of workability, softness, nail-holding power, and colour were satisfactory.

The author discusses briefly the occurrence of knots and staining in these timbers, and also bark allowance. Recommendations are made for the dimensions of green boards that will yield the best results in case manufacture. Service tests were carried out on both timbers, and the results are given. *From authors' summary.*

33.8. *Other Manufactured Products*

33.8 : 12.26–8. **Wooden tyres. Satisfactory tests in Sweden.** *Timb. Tr. J.* 168, 1944 (448).

Wooden tyres, each consisting of 32 sections of Beech timber joined together by a system of vertical laminations and fixed to an ordinary wheel rim, have been given a practical test over a distance of about 4,000 miles of rough country with satisfactory results. The tyres have proved to be durable and have not caused any exceptionable vibration or wear and tear on the chassis.

33.8 : 33.15. MCINTYRE, R. B. **Design features of the Mosquito.** *Aircraft Engng.* 16 (181), 1944 (64–7 + illus.).

Having dealt briefly with the history of the design, and the main features of the aircraft, a detailed description of the construction is given, and the article is concluded by giving some aerodynamic details.

33.8 : 33.15, MCINTYRE, R. B. **De Havilland Mosquito.** *Canad. Aviation* 17 (2), 1944 (54–5).

The design and structural features of this all-wood aircraft are discussed briefly in general terms.

33.8 : 33.15. MORSE, W. L. **Wood in aircraft.** *Aeronautics* 10 (4), 1944 (52–3).

The types and treated forms of wood used in aircraft construction are briefly discussed in general terms.

33.8 : 33.15. GOFF, W. E. **The Horsa glider.** *Aircraft Prod.* 5, 1943 (464–72, 518–29).

Constructed in wood and plywood this aircraft, which is 67 ft. long and 88 ft. wing span, and weighs nearly 4 tons empty, is being made by furniture manufacturers and coachbuilders throughout Great Britain. The article gives a detailed description of the methods, the jigs, tools and other apparatus used by the various firms.

33.8 : 33.3. **Resin impregnation of jute mill bobbins.** *J. sci. industr. Res., India* 1, 1943 (323–4). L.S.

The recent shortage of imported bobbins has led to the production in India of bobbins from certain indigenous woods, such as Haldu (*Adina cordifolia*), which machine well and acquire a fine finish but are apt to suffer from brittleness. Treatment with a drying or semi-drying oil mixture increases to some extent the service life of the bobbins, but even more satisfactory results have been obtained by impregnation with resin; the service life of resin-impregnated bobbins was about 5½ times that of oil-treated bobbins in trials at two jute mills.

The raw materials and equipment required for resin impregnation of bobbins and the estimated cost of treatment are indicated.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34 : 98.1 : 33.38. ROBERTSON, W. A. **[Forest products.] (3) The minor products.** *J. roy. Soc. Arts* 92, 1944 (110–7). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

The effect of the war on supplies to Britain is discussed, and an account given of new sources of supply in the British Empire. Mention is made of the revival of wild rubber collection in Africa and Brazil and of the substitution of Indian Bamboo for supplies from Burma and China. The production of charcoal in Britain to replace supplies from the European continent is also dealt with. Other minor products receiving attention are naval stores, fibres, wild silk, tanstuffs, wood extracts, oils and drugs. It is suggested that greater activity in the field of clinical research in tropical countries would produce new and valuable drugs.

34.2. *Vegetable Products*

34.2 : 12.25–8 (76.6). SHEAD, A. C. **Industrial plant biochemical utilization of Oklahoma flora.** *Abstr.* in *Proc. Okla. Acad. Sci.* 23, 1943 (54–5). L.S.

Oklahoma trees capable, while alive, of producing gums or other products of economic importance include Sugar Maple (*Acer saccharum*), Sweet Gum (*Liquidambar styraciflua*) (storax), *Fraxinus ornus* (mannitol), *Rhus verniciflua* (varnish), Mesquite (*Prosopis* sp.) (gum), Ornamental Olive (gum), and Pines (turpentine and resin). Trees that must be destroyed in order to secure their special products include Bois d'Arc (*Maclura pomifera*) (dye), Sassafras (*S. officinale*) (essential oils and dye), Horse Sugar (*Symplocos tinctoria*) (dye), Indian Cherry (*Rhamnus caroliniana*) (dye and tannin), Dyers' Oak (tannin and dye), Cedar (insecticides and Cedar wood oil), and Sweet Birch (*Betula lenta*) (essential oil).

34.21. Fodder Grass and Grazing

34.21 : 61.31 : 12.19.3. CANFIELD, R. H. **Measurement of grazing use by the line interception method.** *J. For.* 42, 1944 (192–4).

34.24. Tanning Materials. Cork

34.24 : 12.14.8 : 12.25 : 12.26–8. FOWLER, M. E. **Studies on deterioration of tanbark.** With discussion. *J. Amer. Leath. Chem. Ass.* 38, 1943 (400–12). L.S.

Tests were carried out to determine the effect of 7 different methods of curing on Chestnut Oak (*Quercus montana*) and Hemlock (*Tsuga canadensis*) tanbark. Data are given on the appearance of the bark, the percentage of mould growth (*Penicillium* and *Cladosporium*), the percentages of total solids, soluble solids, non-tannin, and tannin (on a moisture-free basis), and the percentages of moisture and tannin before grinding. Under normal conditions the bark, if not too wet, will cure satisfactorily if placed in a rick situated in an open, dry, well-ventilated place soon after peeling or after having been left spread out for a few days.

34.24 : 12.14.8 : 12.25. KUBELKA, V., MASNER, L., MÍCEK, K., and DUŠANEK, V. **Sulphite extraction of Pine bark.** *Collegium* 1943 (33–59). Chem. Abstr. 38 (275–6). P.R.

The yield of tannin from Pine bark can be increased by 45–75 per cent. by the use of sulphite in the leach water. Laboratory leaching tests were made in order to determine what salts increase yield without affecting the quality of the extract, and to find out what proportion of Na_2SO_3 and $NaHSO_3$ in mixture gave the best results. A laboratory tanning test was carried out with small cubes of hide.

34.24 (73) : 12.26–8 : 21.0–3. RYAN, V. A. **Potential cork areas in the United States. The physicogeographical influence in relation to American cork growing.** [Crown Cork and Seal Co., Inc., Baltimore, Md.] [n.d.] pp. 8.

By applying the fundamental physico-geographic principles dealing with climate, isotherms, frost-freeness, annual rainfall, land forms and soil, an attempt is made to determine the areas suitable for growing Cork Oak (*Quercus suber*) in the United States. These are shown on an outline map, numbered in order of growth possibilities. The evidence suggests that the California Climatic Region will produce cork similar to all Mediterranean grades except Spanish, that the Middle Climatic Region will produce cork almost exclusively of the Spanish grade, while the Southern Climatic Region will produce a grade of cork that is typically Portuguese.

34.25. Medicinal Plants. Edible Plants

34.25 : 12.26–8 (54) : 23.24. **A note on Pyrethrum cultivation.** *Indian For.* 70, 1944 (77–9). [Forest Research Institute, Dehra Dun.]

This paper gives the results of experimental plantings of *Chrysanthemum cinerariaefolium* in various parts of India, including Assam, Bengal, Bombay, the Central Provinces, Madras, the Northwest Frontier Province and the Punjab.

34.25 : 12.14.7 : 12.26–8. FRENCH, M. H. **Composition and nutritive value of pulp and seeds in the fruit of the Baobab.** *E. Afr. agric. J.* 9, 1944 (144–5). [Veterinary Laboratory, Mpwapwa, Tanganyika Territory.]

The pulp and seeds of Baobab fruits have a feeding value similar to that of other local tree pods. These are not, however, eaten in large quantities and cannot form a large part of the stock diets. The consumption of only small quantities is to be encouraged in the second half of the dry season because the feeding value of the pulp and seeds mixture is then superior to that of the grazings. Pigs show a marked liking for this mixture of pulp and seeds. The seeds possess a hard coat and the feeding value of the mixture would probably be increased by crushing the seeds. *From author's summary.*

34.25 : 12.26–8 (85). HODGE, W. H. **Hunting Cinchona in the Peruvian Andes.** *J. N.Y. bot. Gdn.* 45, 1944 (32–43).

Since the loss of the Cinchona plantations of Java, the United States Office of Economic Warfare has made a survey of the original Cinchona areas from Colombia to Bolivia in an attempt to increase the production of quinine in the Americas. Peru is proving to be one of the most important sources of supply. Only three of the Peruvian species of Cinchona are important commercially. Each has a great variety of forms, some of which are of no economic value. Most important economically is *Cinchona officinalis*, the original source of most of the superior plantation strains developed in the Dutch East Indies. Certain forms of *C. officinalis* (particularly the form known as Calisaya) possess a bark very rich in alkaloids. The species occurs mainly at elevations of 6,000–10,000 ft. Between 4,000 and 6,000 ft. the commercially unimportant species *C. pubescens* forms its heaviest stands.

The largest of the commercial Cinchonas, *C. micrantha*, is found at elevations of 2,000–4,000 ft. Although this species possesses a low-grade bark, its large size makes it an important source of quinine in the present emergency. The work of the 'cascarilleros' who collect the bark is briefly outlined.

34.25 : 12.26–8. ZUGURMA, J. ***Boscia senegalensis* Lam.** *Farm and Forest* 4, 1943 (197–8).

B. senegalensis is a shrub or small tree found in northern Nigeria. The fruit, which consists of two or three bean-like seeds covered by a hard coat, can be used for food; its preparation for this purpose is described.

34.26. Resin. Gums. Turpentine. Oils. Rubber. Latex. Dyestuffs. Sugar

34.26 : 12.25. FARQUHAR, N. G. **Soap from Southern Pines.** *Chem. metall. Engng.* April, 1943 (108). [Hercules Power Co., Wilmington, Del.] L.S.

A preliminary report on tests that are being made on rosin soaps. On the basis of the results obtained thus far it is recommended that the rosin content of soap be limited to 3–30 per cent. of the total stocks used.

34.26 : 12.25 (44). LEES, P. M. La explotación resinera en los pinares del sudoeste de Francia. [**Resin exploitation in the Pine forests of southwestern France.**] *Rev. Fac. Agron., Montevideo* No. 29, 1942 (9–45). [Span.] A.P.B.

34.26 : 12.25 : 31.2. ZANKOFF, N. Untersuchungen über Harzgehalt und einige physikalische Eigenschaften des Holzes der bulgarischen Nadelhölzer Peuce, Kiefer und Schwarzkiefer. [**Investigations on the resin content and some physical properties of the wood of the Bulgarian conifers *Pinus peuce*, *P. sylvestris*, and *P. nigra* var. *austriaca*.**] *Holz* 6, 1943 (100–9). [G.g.] P.R.

Following a general discussion of resin extraction from wood with the aid of solvents, the author gives data on the distribution of the resin in the stem for each of the three species *P. peuce*, *P. sylvestris* and *P. nigra*

var. *austriaca*. The resin content has no influence on the structure of the wood; it influences the physical properties of the latter only through its own physical properties (weight and volume).

34.26 : 12.14.7 : 12.26–8. JAMIESON, G. S., and ROSE, W. G. **The seed oil of *Garcia nutans*.** *Oil and Soap* 20, 1943 (202–3). [U.S. Bureau of Agricultural and Industrial Chemistry.] P.O.

Chemical analysis of the seed oil of *Garcia nutans* (known in Mexico as Pinonchillo) showed the principal constitutent to be eleostearic acid (89·0 per cent.). The saturated acid content is very low, being only 2·2 per cent. Eleostearic and saturated glycerides and the unsaponifiable matter amount to 98·1 per cent. of the oil. The undetermined 1·9 per cent. probably consists of oleic and linoleic glycerides. It appears probable that the oil contains substances that effectively retard polymerization or oxidation, since a thin film of the oil, exposed to the air but not to the sun, required more than a week to dry.

34.26 : 12.14.7 : 12.26–8. MANJUNATH, B. L., and NAGARAJ, B. S. **Chemical investigation of the fatty oil from the seeds of *Xylia xylocarpa*.** *Half-yrly. J. Mysore Univ.* (*n.s.*) Sect. B, 3 (1), 1942 (105–12). [Central College, Bangalore.] L.S.

Xylia xylocarpa is a large, typically gregarious tree indigenous to Central and South India. Its seeds contain a slightly reddish-brown oil which consists of (1) unsaturated acids—oleic and linoleic acids; (2) saturated acids—principally behenic (17·3 per cent.) and lignoceric acids, and traces of palmitic, stearic and cerotic acids; (3) unsaponifiable matter—a phytosterol, m.p. 136°–37° C.

The seed of *X. xylocarpa* may be a useful source of behenic acid.

34.26 : 12.14.7 : 12.26–8. ROSE, W. G., and JAMIESON, G. S. ***Licania arborea* (Cacahuananche) seed oil.** *Oil and Soap* 20, 1943 (227–31). [U.S. Bureau of Agricultural and Industrial Chemistry.] P.O.

The kernels (which amounted to 45 per cent. of the air-dried fruits) of *Licania arborea* contained 68·9 per cent. of oil and 3·2 per cent. of moisture. Chemical analysis of the oil showed it to be composed mainly of licanic acid.

The drying times of varnishes prepared from *Licania arborea* oil were similar to those for oil of Oiticica (*L. rigida*), and cold- and hot-water tests made on the varnish films were found to give satisfactory results. It therefore seems that the oil could be used to advantage by the paint and varnish industry.

34.26 : 12.26–8. SOUZA MACHADO, A. A. DE. **Em tormo do bálsamo de copaiba-jacaré e de seu emprego como sucedâneo do bálsamo peruviano. [The essential oil of *Eperua oleifera* and its use as a substitute for Peruvian Balsam.]** *Bol. Minist. Agric., Brazil.* 31 (11), 1942 (47–9). [Port.]

Note on the chemical composition of this essential oil.

34.26 : 12.26–8 : 23.24 : 4. DAWSON, T. R. **Planting and production of raw rubber and latex, gutta-percha, balata, chicle and jelutong.** *Ann. Rep. Prog. Rubb. Tech.* 6, 1942 (3–11). [Institution of the Rubber Industry.] L.S.

Mainly a review of the results of recent investigations on *Hevea*, including information on propagation and planting material; soils, fertilizers and cover plants; diseases, pests and other damaging factors; the extraction of the rubber; standardization of crude rubber; and methods of concentrating the latex.

A short section on non-*Hevea* rubbers is appended.

34.26 (54) : 23.4 : 12.26–8 : 44.3. KURIEN, P. J. **Cultivation of rubber in India.** *J. sci. industr. Res., India* 2, 1944 (124–7).

Some silvicultural details of *Hevea brasiliensis* are given and the budding process is briefly described. The methods used for the prevention of root, stem and leaf diseases are outlined and the article concludes with some notes on the method of extracting latex.

34.26 : 12.26–8. MARTIN, G. ***Funtumia* and Ceara v. *Hevea*.** *India-Rubb. J.* 105, 1943 (464–5). L.S.

Neither Ceara (*Manihot glaziovii*) nor *Funtumia elastica* is so exacting as *Hevea* as regards climate. Ceara also has the advantage of quick growth and early seed production, and is able to thrive on poor soils unsuitable for the growth of *Hevea*. *Funtumia* gives a good yield of rubber per tapping per tree, but, as in the case of Ceara, the tree is difficult to tap and is easily damaged. The yield per acre for both species is much less than that for *Hevea*, and the quality of rubber produced, even under the best conditions, is from 5 to 8 per cent. inferior.

34.26 (941) : 12.26–8. MILLINGTON, A. J. **Rubber production in relation to Western Australia.** *J. Dep. Agric. W. Aust.* 20 (2nd Ser.), 1943 (196–200). L.S.

Guayule (*Parthenium argentatum*) appears to be the most likely domestic source of rubber in Western Australia after the war. Brief notes are given on the cultivation and economics of this plant.

34.26 (6) : 12.26–8. TRISTAM, G. R., GEE, G., TRELOAR, L. R. G., and JEFFREY, G. A. **Characteristics of wild rubbers.** *Trans. Inst. Rubb. Ind.* 18, 1943 (253–6). [British Rubber Producers' Research Association, Welwyn Garden City, Herts.] L.S.

Examination was made of the composition, physical properties and molecular weight of a group of five wild African rubbers, including samples from species of *Clitandra*, *Funtumia*, *Landolphia* and *Ficus*. For purposes of comparison corresponding observations were made on *Hevea* rubber, balata, and a specimen of Malayan *Ficus elastica*. The authors are of the opinion that the rubbers examined are, without exception, polyisoprene rubbers, identical in their chemical constitution and, when purified, similar in physical characteristics to ordinary *Hevea* rubber.

34.26 : 12.26–8. VISWA NATH, B., and others. ***Cryptostegia grandiflora* R. Br.: a war-time source of vegetable rubber.** With appendices. *Suppl. to J. Sci. industr. Res., India* 1, 1943 (335–76). L.S.

A fairly comprehensive account is given of investigations carried out by the Imperial Agricultural Research Institute on *Cryptostegia grandiflora*, its propagation by cuttings and seeds, methods of latex collection and coagulation, and the influence of the frequency and time of tapping on the regeneration of the plant and the yield of latex. A simple and cheap method of water coagulation of latex is described. Special attention is given to the practical application of the results obtained.

34.26 : 12.26–8. BENSMAN, S. A., and PROSHKIN, G. N. **Natural dyes from peat, brown coal and Alder bark.** *Legkaya Prom.* No. 1/2, 1943 (12). [Russ.] Chem. Abstr. 38 (645). P.R.

Aqueous NaOH extract of Alder bark was applied to ɔtton with a little $FeSO_4$, and to wool with $FeSO_4$ and ɜze. The cotton was dyed grey, while the wool was ɣed green-black. By using various metal salts there ere obtained beige, brown, olive, black and other ɔlours. Detailed experimental data are given.

4.26 : 98.1 : 12.26–8 (71.4) : 60.31.2 : 97.2. DELISLE, R. 'exploitation de l'érable pour sa sève. [**Exploitation of ıe Maple for its sap.**] *For. québec.* 7, 1944 (271–82). F.]

The author presents arguments in favour of the xploitation of Maple groves for the production of sap ıther than of timber. Maple wood is of some value ɔr charcoal and as fuelwood, but in normal times the emand for wood charcoal in Quebec is very limited, ıd, although the demand for fuelwood is greater, the ıarket is soon saturated and the price drops. Woodnds used for the production of Maple sugar will ring in a much greater revenue than similar areas used ɔr the production of Maple timber. Moreover, the Iaple sugar and syrup industry shows no sign of eaching a state of over-production.

In counties such as Beauce, where at least 50 per cent. f the farmers cultivate Maple for its sap, the farm oodlands are generally better managed than in other eas, and the farmers have become genuinely interested ı forest conservation and the practice of silviculture.

Certain measures are recommended for the develop- ent of the maple sugar industry and the cultivation of Iaple groves. The improved management of the oves already in production is of primary importance. t present the main faults in management are: (1) the pping of small trees, (2) grazing by domestic animals, nd (3) insufficient cleaning and improvement cuttings.

4.26 : 12.26–8. JOHNSON, L. P. V. **Sugar production y White and Yellow Birches.** *Canad. J. Res.* 22, Sect. ., 1944 (1–6).

White and Yellow Birch trees produced an abundance f sap, but the yield of sugar was on the average only bout one-third that of the Sugar Maple. Results ıdicate that Yellow Birch sap contains invert sugar ith small amounts of sucrose, and that White Birch ap contains a mixture of fructose and invert sugar. yrups prepared from White and Yellow Birch saps by ɔncentrating 100 times were similar in taste and ppearance to commercial corn syrup. *Author's summary.*

4.26 : 12.25 : 12.14.7. KRASINSKI, N. P. Mozhzheveɔvaya yagoda—novȳ istochnik sakharistȳkh veshestv. [**The Juniper berry—a new source of saccharine ubstances.**] *Bot. Zh. S.S.S.R.* 28, 1943 (208–10). [Russ.] .G.B.

Up to 30 per cent. of the fresh weight of Juniper erries is made up of sugars, notably fructose. The uthor describes a simple process developed at Gorky Jniversity for extracting the sugar in water. The extract can be used for a variety of purposes, e.g. the anufacture of 60° Soviet gin.

34.6. *Utilization of Logging and Milling Waste*

4.6. **Wood dust in moulding sand.** *Mech. World* 115, 944 (34). P.R.

Results from investigations indicate that wood dust f suitable types can be used satisfactorily as a substitute ɔr coal dust in moulding sand for most light and medɪm weight iron castings. The proportion of wood dust used is approximately one-fourth the weight of coal dust used for the same type of mixture. The wood dust should be graded before use to remove all material coarser than about 30 mesh B.S.S.

34.6 : 07.7. **The 'Dolem' sawdust-burning furnace.** *Steam Engr.* 12, 1943 (373). L.S.

In the plant described sawdust can be burnt without forced draught or steam jets; the standard furnace is capable of burning 3 to 4 tons of green sawdust daily.

34.6 : 07.7 : 33.02. LEROUX, R. J. **Wood conservation by hydraulic log barking and whole log chipping.** *Paper Tr. J.* 117 (22), 1943 (42, 44, 46, 48). [Weyerhaeuser Timber Co.] P.R.

The method of wood preparation in common use in sulphite pulp mills, whereby the logs are slabbed, sawn into cants and barked by knife, involves a wood loss of approximately 30 per cent. Following the development of new equipment for use in wood preparation this loss has been reduced to 7–8 per cent. representing the bark only. This equipment, which is described briefly in this paper, includes a machine in which the bark is removed from the log by water pressure, a chipper large enough to chip logs up to 40 in. in diameter, and a band saw to reduce logs over 40 in. in diameter into sections of size suitable for the chipper. The operations of barking and chipping a 40-in. log 20 ft. long can each be accomplished in less than 30 seconds, and operating 8 hours per day the unit can produce sufficient chips for the manufacture of 275 tons of sulphite pulp daily.

Use of the new equipment has resulted in a marked reduction in the manpower required in wood preparation and in the amount of log required per unit of pulp produced.

As a further step in the reduction of waste, the wood is treated with chlorine to remove black knot and dark seam dirt; this is done before the barking and chipping operations.

34.6 : 33.06. SCOTTISH MACHINE TOOL CORP., LTD., and CLEMENTS, A. B. **Production of [fuel] briquettes.** *British Patent* No. 556,632, June 26, 1942. Brit. Chem. Physiol. Abstr. B I, 1944 (11). P.R.

Coal, crude oil and sawdust are mixed (ratio 90 : 10 : 5–15) and then briquetted.

34.6 : 38.1. BARTL, K. **Concrete made with wood waste.** *German Patent* No. 728,219, Oct. 22, 1942 (Cl. 80*b*. 21.04). Chem. Abstr. 38 (467). P.R.

Sawdust or turnings are steeped in H_2O, washed, then saturated in a suspension of coal dust to prevent decay and finally mixed with cement.

38. FOREST CONSTRUCTIONAL WORKS. ENGINEERING

38.1 : 31.27. SEILER, J. F. **National Bureau of Standards tests disclose high strength of composite wood-concrete slab.** *Wood Pres. News* 22, 1944 (5–9, 12). P.R.

Wood-concrete slabs as used in recent pier construction in the United States, consisting of a solid base of laminated planking with a covering of 4–6 in. of concrete, were tested under loads up to a maximum of 181,000 lb. at which failure took place. Immediate cause of failure appeared to be the shearing of the concrete along the edge of the loading plate.

38.1 : 33.15. **Plywood plate girders for buildings.** *Engng. News-Rec.* 131, 1943 (690–2). L.S.

Girders and joists in which the web is a single thickness of plywood and the flanges are of dimension lumber are now being used in building construction. Stresses are transferred from the flanges to the web by gluing the members together and by placing dowels at intervals along the flanges.

38.1 : 34.6. **Sawdust cement.** *Wood* 8, 1943 (248–50, 271–2). [Information Bureau of the Building Research Station.]

Sawdust cement is made by mixing sawdust, Portland cement and water, and casting the mixture in a mould. Uses and attempted uses for this material include flooring, roofing, wall panels, timber substitutes, and surfacing for other pre-cast concrete pieces.

The properties of sawdust cement vary mainly according to the proportion of cement to sawdust used, the practical range being from 1:1 to about 1:5 by volume, although proportions of 1:2 to 1:3 probably represent the most useful range. The principal disadvantages of this material are (1) a very high shrinkage on drying and expansion on re-wetting, and (2) the difficulty of securing uniformity of properties in different mixes.

These and related problems are discussed, and, on the basis of tests made on this material over a number of years, certain precautions are suggested with respect to its manufacture and use. A series of simple tests may be used for controlling the quality of the product for a particular purpose. Test data showing the effect of different sawdusts on plastic mixes, 1:3 by volume, are tabulated.

38.1 : 34.6. FRIEDMAN, L., EZELL, A. I., and ENGLERT, R. D. **Sawdust plaster project.** *Timberman* 45 (2), 1943–44 (78; 80).

On the basis of extensive tests of plasters made of wood flour and various synthetic resins, using non-aqueous solvents, the following combination was selected as best with reference to workability, quality and economy:—80 wood flour 20 parts, Ethocel 100 cps 7 parts, alcohol 50 parts and paint thinner 35 parts. Plaster of this type is to be applied as a thin surface coating over a wall base of low-grade plywood or boards.

38.1 : 92 (94). **Control of Timber Order No. 12. Prohibition and use of building scantling from lighter Victorian hardwoods.** *Aust. Timb. J.* 9, 1943 (435, 443).

A statement by the Controller of Timber explains that the serious lowering of stocks of seasoned hardwood has necessitated legislation prohibiting the production and use of the lighter hardwoods in Victoria for building scantling without the written approval of the Controller. The measure will permit stocks of seasoned wood to be built up during the summer months to meet expected heavy demands in the autumn and winter of 1944. Three species are covered by the Order: *Eucalyptus regnans*, *E. gigantea* and *E. nitens*.

38.1–3. RICHART, F. E., and WILLIAMS, C. B. **Tests of composite timber-concrete beams.** *J. Amer. Concr. Inst.* 14, 1943 (253–76). L.S.

Composite beams and slabs of timber and concrete offer a very useful form of construction for heavy floors of highway bridges, piers and similar structures. The essential feature of such floors is a shear connexion between the timber and the concrete elements. Tests on a number of types of shear units are described in this paper and their relative effectiveness is discussed. Working stresses are proposed and methods of applying composite construction to continuous structures are briefly outlined. *Authors' summary.*

38.2. AMIRIKIAN, A. **Navy develops all-timber blimp hangar. I. Unprecedented design problems encountered. II. Construction procedure.** *Civ. Engng.* 13, 1943 (471–4, 525–8). L.S.

38.2. GREENHALGH, R. **A few ideas on timber development. No. 1—floors. No. 2—doors.** *Wood* 8, 1943 (246–7); 9, 1944 (15–6).

Suggestions are made for improvement in design and construction.

38.2. HUNDEVAD, J. **Portable camps on skids.** *Pulp Paper Mag. Can.* 44, 1943 (816–8, 828).

38.2 (410). BROUGHTON, R. V. **Timber and pre-fabrication.** *Wood* 8, 1943 (268–9).

A general discussion of the principles of pre-fabrication of wooden houses. Under British conditions it is usually essential to cover the site with concrete as a precaution against dampness.

38.2 (410). **Timber houses. Extracts from the report on house construction by an interdepartmental committee appointed by the Minister of Health, the Secretary of State for Scotland, and the Minister of Works.** *Wood* 9, 1944 (90–2).

Notes are given on experience gained with timber houses built in Britain during the past twenty years, based on data obtained by inspection of representative samples. On all sites the houses have been found to be satisfactory by the tenants, and no major defects have developed. It would appear that most of the houses were built at a slightly higher cost than comparable brick houses, but maintenance costs have generally been the same. The houses were generally built at about the same speed as brick houses, but, in the case of a group of houses that were pre-fabricated in Norway, there was an appreciable saving in site labour. There was no overall saving in craftsmen's labour as compared with brick houses. For the most part construction was dry, and the houses were habitable immediately on completion.

38.2 : 31.2. REECE, P. O. **Design of timber structures.** *Wood* 9, 1944 (64–70). *Extracts* from paper on 'Developments in the Design of Timber Structures'.

A discussion of recent trends in design with special reference to stress grading of timber and to the use of laminated wood and mechanical timber connectors.

38.2 : 31.27. MACKINTOSH, C. **Preventing failure of timber joints.** *Civ. Engng.* 13, 1943 (573–5). L.S.

Owing to the unfamiliarity of designers with the properties of wood, a number of failures in tension across the grain have occurred in timber structures. The writer discusses the character and principal causes of these failures and makes suggestions for their cure.

38.3 (728) : 33.36.1. **The Inter-American Highway.** *Engineering* 157, 1944 (301–3, 310, 341–2, 350).

One of the several bridges built of untreated local timber on the Guatemalan section is illustrated. The bridges cost 100 dollars per foot excluding the foundations. On the Salvador section, temporary bridges are being made from local timber, but for permanent bridges, 100 ft. span trusses made of treated timber fabricated in the U.S.A. are used.

4. FOREST INJURIES AND PROTECTION

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

2 : 12.26–8. CHESTER, K. S. **Physiogenic brooming in Chinese Elm.** *Proc. Okla. Acad. Sci.* 23, 1943 (46–9). .S.

Examination of a block of trees of *Ulmus pumila* L. ear Oklahoma City, which were bearing galls and roducing conspicuous brooming, indicated that the ymptoms of disease were not due to any determinable athogenic organism. The brooming was found not to e graft-transmissible, and during 5 years there was no vidence of its spread to healthy trees in the vicinity. Broomed trees recovered in 1 or 2 years after being ransplanted to favourable locations. The disease is herefore believed to be physiogenic in character, due rincipally to the large amount of clay in the subsoil, vhich prevents the development of a root system ufficiently extensive to withstand the effects of moderate rought. Severe drought, insect damage, ice, and sun-cald may have been contributory factors.

42.1. *Air Currents*

2.1 : 32.25 : 32.82 : 45.3. TRÄGÅRDH, I., and BUTO-ITSCH, V. **Råd och anvisningar angående behand-ngen av den stormfällda skogen. [Recommendations nd directions as to the treatment of forest blown down y storms.]** *Flygbl. Skogsförsöksanst., Stockh.* No. 55 1943] pp. 4. [Sw.]

Directions are given for the conversion of storm-lled timber and for the storage of logs, and also for the reatment of the remaining forest, particularly of storm-amaged trees. These should be felled and the wood sed immediately, or they may be used as trap trees in ne control of bark beetles.

42.2. *Temperature Influences*

2.22 : 12.25 : 45.3. MACALONEY, H. J. **Relation of oot condition, weather and insects to the management of ack Pine.** *J. For.* 42, 1944 (124–9). [U.S. Bureau of ntomology and Plant Quarantine, Milwaukee, Wis.]

Following widespread mortality and decadence in ands of Jack Pine (*Pinus banksiana*) in northern innesota, ecological studies were made of the owns, roots, and rate of growth of 37 trees classified n the basis of crown development; 26 were living nd eleven were dead. A definite relationship was etermined between root development and tree vigour, ead and decadent trees invariably having short p roots and vertical roots and under-developed teral roots. Lack of soil moisture appeared to be the ain cause of the damage, although defoliation by bud-orms (*Archips fumiferana*) and sawflies (*Neodiprion anksianae*) also played a part. A very marked eficiency in rainfall with severe periodic droughts and gh temperatures caused high mortality of feeding ots and was a major factor in causing decadence.

Except on the best sites Jack Pine begins to decline vigour at 50 years of age and it is recommended that hen this occurs, particularly during a period of mois-re deficiency, the stand should be marked for the moval of unprofitable trees.

2.23 : 12.26–8. POMERLEAU, R. **L'insolation de rable. [Sun scorch of Maple.]** *For. québec.* 7, 1944 41). [F.]

A note on the occurrence of trunk wounds on young Maples due to excessive exposure to hot spring sunshine.

42.5. *Chemical Influences. Nutrient Deficiencies*

42.5 : 21.32 : 12.25 : 56. NĚMEC, A. **Investigation of the nutrition of a stunted stand of Spruce in the Reviere Tusch in the Bohemian Forests.** *Sborn. čes. Akad. Zemědělské* 15, 1940 (35–45). *Chem. Zbl.* I, 1941 (1085). Chem. Abstr. 37 (493). P.R.

It was found that the main physiological cause for reduced growth was an extensive interference with Ca absorption. The affected trees appeared to attempt to compensate for the critical deficiency of base primarily by increased absorption of K and Mg, which were present in the soil in large quantities, as well as by increased absorption of the sesquioxides (chiefly of Al and Mn). This produced no improvement in growth. The fact that Larch in the same stand grew well is due fundamentally to the different nutritive requirements of the Larch. The latter requires less lime but essentially larger amounts of Mg than the Spruce.

43. FOREST FIRES

43.0. *Predisposing Factors and Causes*

43.01 (71.4) : 11.1. VILLENEUVE, G. O. **Forest meteorology in Quebec.** *For. Chron.* 19, 1943 (203–18). [E.f.]

Meteorological research in relation to forest-fire danger began in Quebec in 1928 and since then weather stations have been established throughout the Province. Four main meteorological organizations serve the Province; they are the Dominion Meteorological Bureau, the Quebec Stream Commission, the Forest Protective Associations and the Provincial Meteorological Bureau.

The importance of calculating an inflammability index and of forecasting future atmospheric conditions is especially great since statistics recorded over a number of years indicate the areas where fires occur most frequently. Methods for the determination of the inflammability index are described, including a system used in the United States and the Wright system used in Canada. The latter has wide application owing to its simplicity, and at present seems to be the best method for calculating accurately the condition of a forest with regard to fire danger.

The use of fire-danger meters in the United States is dealt with and the key danger factors for different regions are noted. The system is not yet perfected.

Various types of forecasts are discussed, in particular that based on the use of tables [cf. *For. Abstr.* 1 (128)] which enables forest rangers to make their own forecasts if they are unable to obtain the necessary information from Toronto. Results from the use of these tables have been satisfactory, and it is suggested that they are sufficiently accurate for wider adoption.

A Provincial Meteorological Bureau is needed, basing its forecasts on synchronous data furnished by Washington and Toronto and also on data supplied by organizations set up to study atmospheric conditions in the Province of Quebec only. The elements to be forecast would be precipitation, wind, temperature,

dew point, relative humidity, evaporation and cloudiness. Descriptive terms for wind and rainfall are suggested, and also a method of forecasting relative humidity. An empirical formula for evaporation is based on data from the experimental station of Duchesnay, Co. Portneuf, and it is thought that a similar computation for other stations would give good results.

In order to draw a weather map for the Province of Quebec more weather stations would have to be established, particularly in the northern part of the Province.

43.1. *Protective Measures*

43.1 (71.4). BERNIER, G. H. La protection des forêts contre l'incendie. Le système provincial de protection contre les feux de forêts. [**The protection of forests against fire. The provincial system of protection against forest fires.**] *For. québec.* 7, 1944 (6–7) [F.] [Dépt. des Terres et Forêts.]

Fire protection in Quebec is controlled by the Protection Service of the Ministry of Lands and Forests, by six protection syndicates formed by persons holding forest lands, by private organizations under the control of individual forest enterprises, and by two committees representative of the railway interests.

43.1 (71.4). BERNIER, G. H. La protection des forêts contre l'incendie : distribution des forêts de la Province au point de vue protection contre l'incendie. [**The protection of forests against fire: distribution of the forests of the Province from the point of view of protection against fire.**] *For. québec.* 7, 1944 (142–3). [F.]

Of the 200,531 sq. miles of Quebec which lie south of latitude 51°N, 178,531 sq. miles consist of woodland belonging either to private individuals (26,580 sq. miles) or to the Crown. Excluding small estates of less than 2,000 acres, there are 166,033 sq. miles of woodland which are supervised by protective organizations. To this figure must be added some 384 sq. miles of private woodland which are also patrolled and receive fire protection. Various organizations are concerned with the supervision of fire protection, including the Protection Service (81,600 sq. miles) [cf. preceding abstract] and Protection Associations (80,281 sq. miles).

43.1 (71.4) : 06.1 : 45.3. JENSSEN, S. **Organisation of forest protection in the St. Maurice valley.** *For. québec.* 6, 1943 (274–90). [E.]

An account of the activities of the St. Maurice Forest Protective Association, Ltd., founded in 1912. The association carries out its work in the extensive forests held by its members and has a large staff of inspectors and rangers. It does very considerable educational work, and has agitated for, and organized the execution of, protective legislation. It operates a lookout-tower and ground-patrol system and organizes fire-fighting crews. Its rangers keep check on insect pests by collecting specimens throughout the forests.

43.11 : 07.7. MEADE, O. L. **A grader disc for firebreak maintenance.** *J. For.* 42, 1944 (216–7). [Michigan Department of Conservation.]

A brief account is given of the construction and operation of a dual-purpose machine for use in clearing vegetation from firebreaks. It is equipped with a grader blade and a disc which are interchangeable in the field; it is towed by a 20-h.p. crawler tractor.

44.3. *Fungi*

44.3 : 12.21. ZENTMYER, G. A. **Mechanism of action of 8-hydroxyquinoline.** *Abstr.* in *Phytopathology* 33, 1943 (1121).

8-hydroxyquinoline has long been known to have bacteriostatic and fungistatic properties, and is extensively used as an antiseptic. The fact that it is a useful agent in quantitative analysis for precipitating many minor elements (Cu, Mn, Fe, Zn), suggested the theory that it acts fungistatically by precipitating one or several of these elements so that the micro-organisms cannot use them. *In-vitro* experiments show complete inhibition of growth of several fungi (*Ceratostomella ulmi, Fusarium oxysporium, F. lycopersici, Penicillium* sp.) by 8-hydroxyquinoline at a concentration of 1–10,000 at pH 6. If the acidity is increased to pH 3, by 0·1–N HCl, growth of these fungi is unaffected by the presence of 8-hydroxyquinoline. When a culture growing at low pH (3·0), in the presence of 8-hydroxyquinoline, is filtered through a Berkefeld filter and the filtrate is readjusted to pH 6 and re-inoculated with the fungus, inhibition of growth occurs. These findings are in agreement with the fact that the inner complex metal-hydroxyquinoline salts are known to be soluble in solutions of mineral acids. This cyclic organic chemical thus may be acting as an anti-vitamin, in the case of minor elements which are connected with vitamin formation and action.

44.3 : 12.25 : 12.21. HEPTING, G. H., and DOWNS, A. A. **Root and butt rot in planted White Pine at Biltmore, North Carolina.** *J. For.* 42, 1944 (119–23). [Appalachian Forest Exp. Sta., Asheville, N.C.]

Root and butt rots caused mainly by *Fomes annosus* and to a small extent by *Polyporus circinatus* and *P. schweinitzii* were found in a high percentage (75 per cent.) of trees in previously thinned White Pine (*Pinus strobus*) plots and in a smaller percentage of isolation strip trees; a very small percentage (4 per cent.) of trees in previously unthinned plots had butt rot. Dead roots, probably resulting from poor planting, provided the entry points for the fungi. The larger amount of butt rot in thinned stands may be due to a build-up of *Fomes annosus* in the stumps of thinned trees.

44.3 : 12.25 : 12.21. : 55. HIRT, R. R. **Distribution of blister-rust cankers on Eastern White Pine according to age of needle-bearing wood at time of infection.** *J. For.* 42, 1944 (9–14). [New York State College of Forestry, Syracuse, N.Y.]

A study of the development of cankers on current-season, year-old, and 2-year-old wood of young Pine following blister-rust (*Cronartium ribicola*) infection showed that (*a*) the relative amount of infection for any season can be closely approximated by the autumn of the next year and determined accurately the following spring, and (*b*) the majority of cankers develop on needle-bearing wood that is one year old at the time of exposure. This was true of 3- to 6-year-old potted plants and 4- to 11-year-old undisturbed natural reproduction of Eastern White Pine (*Pinus strobus*), and also of 7 other 5-needled Pines.

44.3 (78) : 12.25 : 12.21. MIELKE, J. L. **White Pine blister rust in western North America.** *Bull. Yale Sch. For.* No. 52, 1943. pp. [vi + 155 + plate.]

White Pine blister rust, the most serious fungous disease of forest trees in western North America, is

elieved to have been introduced into this area in a ngle shipment of Eastern White Pines from France in 910, although the pathogen (*Cronartium ribicola*), hich is of Asiatic origin, was discovered in British olumbia only in 1921. The seven indigenous species ? White Pine are all susceptible to the disease, but, ithin their natural stands, only three of these, Western 'hite Pine (*Pinus monticola*), Whitebark Pine (*P. 'bicaulis*) and Sugar Pine (*P. lambertiana*), are known) have become infected naturally. Western White ine is the species most commonly attacked.

The present bulletin deals comprehensively with ractically all aspects of the disease both in Pines and in *ibes*. Consideration is given to the mode of infection, ie factors influencing the incubation period, the pro- uction and dispersal of spores, the rate of canker rowth, the relation between weather conditions and the read of the disease, as well as many other relevant ctors. An account is also given of the spread of the ist from year to year during the period 1910 to 1942, clusive.

The spread of the disease over long distances takes lace by means of wind-borne aeciospores which, nder favourable conditions, may be carried distances f 300–400 miles, or even further. Records from the pper air currents have proved valuable in enabling the outhward spread of the pathogen to be forecast with me accuracy. Moisture is a highly important factor the spread and intensification of the rust. From ie point of its introduction near Vancouver the dis- ibution of the fungus on both Pine and *Ribes* extends mewhat further to the south than to the east, lthough the intensity of spread has been heaviest in the tter area. The few biological factors which are un- avourable to the development of the disease may educe the intensity of infection locally, but they have ad little effect upon the general rate of spread. iñon blister rust, which also has *Ribes* as an alternate ost, may be distinguished from White Pine blister ist in the telial stage by a microchemical colorimetric st.

4.3 (75.2) : 12.25 : 12.21. TEMPLE, C. E., and YOST, I. E. **White Pine blister rust control in Maryland.** *Bull. Md. Univ. Ext. Serv.* No. 98, 1943. pp. 23.

White Pine blister rust, although well-known and idely distributed in Europe and Asia for many years, as first discovered in Maryland on a yellow-flowered urrant in Washington County in 1931, but later ndings of infected Pines indicate that the disease robably became established in Garret County about 924. This pamphlet briefly outlines the history and read of the blister rust disease, the life cycle of the ausal fungus (*Cronartium ribicola*), the characteristic ppearance of the disease on both Pine and *Ribes*, nd methods of control.

Control work has now been carried out within and round most of the better stands of White Pine in Maryland, and in many cases the *Ribes* have been uppressed to a point where systematic eradication ill be necessary only at intervals of 5 years or more.

A detailed description is given of the status and ontrol of blister rust by individual counties, and a opy of the State regulations in effect in Maryland for ie suppression of this disease is appended.

4.3 : 12.25 : 12.21. PLAKIDAS, A. G. **Arborvitae light.** *Abstr.* in *Phytopathology* 33, 1943 (1117).

A disease of Oriental Arborvitae (*Thuja orientalis*) referred to locally as 'blight' or 'fire', has been known in the southern States for many years. Its chief symptoms are dying and browning ('firing') of leaves, small twigs, or entire branches, and often complete killing of the entire tree. The disease has been attributed to red spider, drought, excessive summer heat, and winter injury. The varieties Berkmann's Golden and Baker are most severely affected, but the disease occurs also on many others. Similar symptoms also occur on the Italian Cypress (*Cupressus sempervirens*).

A fungus, apparently a *Cercospora*, has been found constantly associated with the disease. Inoculations with pure cultures have produced it in typical and severe form. Infection has also been obtained by placing conidia-bearing twigs on healthy plants. The fungus has been reisolated from the inoculated plants and resembles somewhat *Cercospora sequoiae* and *C. sequoiae* var. *juniperi*, but differs from these in length of conidiophores and rate of growth in culture. It probably is a distinct species. Perithecia of *Mycosphaerella* sp. are often found on diseased twigs, either alone or in association with *Cercospora*. Ascospore isolates appear similar to *Cercospora* isolates in culture, but inoculations with these have not produced infection thus far.

44.3 : 12.25 (78.8) : 12.21. SHOPE, P. F. **Some ascomycetous foliage diseases of Colorado conifers.** *Colo. Univ. Stud., Ser. D., phys. and biol. Sci.* 2 (1), 1943 (31–43). E.S.R. 90 (357).

This paper assembles information on the known ascomycetous foliage diseases of conifers of interest to Colorado forest pathologists. It is realized, however, that this preliminary list may be incomplete since certain mountainous areas have never been visited by mycologists, and other less isolated regions have been visited but once or twice during the last 50 years. A key to the types (brown felt blight, Cedar leaf blight, Douglas Fir needle blight, conifer snow blight, and needle cast disease) is provided, as well as a separate key to the genera of Hypodermataceae involved in the last type of infection. Indexes to fungus and host names are provided and there are 15 references.

44.3: 12.14.3: 12.25–8: 12.21. BERKELEY, G. H. **Root-rots of certain non-cereal crops.** *Bot. Rev.* 10, 1944 (67–123). [Dominion Laboratory of Plant Pathology, St. Catharines, Ontario.]

Among the root rots discussed in this paper are those caused by the following fungi which attack woody perennials:—*Armillaria mellea* (mushroom root rot) which attacks forest, shade, and fruit trees and certain other crops, including potato, and is practically world-wide in distribution; *Clitocybe tabescens*, another 'mushroom fungus', of rather less extensive distribution, which is responsible for root rot of fruit, forest and ornamental trees, shrubs and vines; *Corticium galactinum*, a white root rot of Apple and other fruit trees, and of Oak, Dogwood, Sumac and other shrubs; and various species of *Phytophthora* which are individually responsible for root rots of Chestnut, Beech, Cypress, Citrus, and Pine seedlings.

The relation between root rots and such factors as temperature, soil reaction, and the water content of the soil is discussed, and methods of control are indicated. Root rots may frequently be held in check by one or more of the following means:—(1) Use of resistant plant varieties; (2) crop rotation; (3) the addition of

organic manures or chemical fertilizers which bring about biological or other conditions unfavourable for the growth of the root fungi; (4) disinfection of the soil; and (5) ring-barking, felling and setting up barriers. The latter include open trenches and artificial barriers such as galvanized iron, or chemical barriers, such as crude oil, sulphur, sulphuric acid and copper sulphate. Ring-barking affected trees has been recommended as a measure against the spread of *Armillaria* and kindred root rots. Trees which die slowly after ring-barking should be felled one year after ringing.

The author concludes with a review of the types of root rot and the present trends in research.

44.3 (82) : 12.26–8 : 12.21. Resultados de los estudios de una enfermedad de los ábamos en la provincia de Buenos Aires. **[Results of studies on a disease of Poplars in the Province of Buenos Aires.]** *Maderil* 16 (186), 1943 (23). [Span.]

Cankers due to *Septoria musiva* have been observed in several regions.

44.3 : 12.26–8. GRIES, G. A. **Juglone (5-hydroxy-1, 4-naphthoquinone)—a promising fungicide.** *Phytopathology* 33, 1943 (1112).

Juglone (5-hydroxy-1,4-naphthoquinone), the oxidized form of hydrojuglone found in members of the genus *Juglans*, is toxic to certain higher plants growing in the proximity of Walnut trees. In standardized laboratory tests for fungicidal activity on a series of naphthoquinones and related compounds, juglone most nearly approached the toxicity of the copper in Bordeaux mixture. The L.D.50 values of freshly extracted or synthesized juglone, using *Sclerotinia fructicola* and *Macrosporium sarcinaeforme* as test organisms, were 0·19 and 0·27 micrograms per sq. cm. respectively. These data were based on a spore load of 50,000 spores per cc. The L.D.50 values increased slightly over a 6-month period under laboratory conditions, suggesting a tendency for juglone to decompose to by-products of a lower order of toxicity. Greenhouse tests proved juglone to be ineffectual as a contact or stomach insecticide. Although the toxicity of juglone to the root systems of higher plants was confirmed, no foliage injury was evident when it was sprayed on cutinized surfaces. Tests in which juglone was used as a seed protectant indicated that it was extremely deleterious to the non-cutinized surfaces of germinating seeds. In preliminary field experiments, promising results were obtained with juglone for the control of black spot of roses.

44.3 : 12.26–8 : 12.21. GRUENHAGEN, R. H. **Life history of *Hypoxylon pruinatum* in relation to pathogenicity on Aspen.** *Abstr.* in *Phytopathology* 33, 1943 (1112).

Aspen, in the Lake States, is used extensively for boxwood, pulpwood, and excelsior, and is a potential source of raw cellulose for explosives and plastics. Stands examined had 10–60 per cent. of the trees infected with *Hypoxylon pruinatum*, which was found to enter only through bark wounds. The best results from inoculation were secured when the fungus was introduced through a wound near the centre of a bruise. An active infection girdled a 4-inch tree in 2–3 years and spread vertically 3–6 ft. The fungus was seen only in microscopic sections of the cortex, cambium, and outer wood. Conidia were borne on conidiophores at the surface of the canker, as well as on raised mycelial pillar-like structures. Conidia were abundant during spring and early summer. Ascospores were forcibly discharged from April through September out of the perithecia in stomata raised above the canker surface. Both conidia and ascospores were windborne. Warm, rainy weather, followed by periods of high humidity, favoured spread of the disease. The organism over-wintered both as ascospores and as mycelium. On 2 per cent. malt agar the organism grew best at 28° C. and at pH 5·0 to 6·0.

44.3 : 12.26–8 : 12.21. LOPES PIMENTEL, A. A. Primeiras notas para o estudo duma doença do castanheiro e nogueira, nos viveiros florestais, causada por um ficomiceta. **[Preliminary notes on the study of a disease of Chestnut and Walnut in forest nurseries, caused by a Phycomycete.]** *Abstr.* in *Rev. agron., Lisboa* 30, 1942 (468–9). [Port.] [Serviços Florestais e da Estação Agronómica Nacional.] L.S.

The disease observed was caused by a Phycomycete, possibly *Phytophthora cambivora*. Results of inoculations of Chestnut indicate extreme virulence.

44.3 : 12.26–8 : 12.21. PHELPS, V. H. **Heart rot of Aspen.** *Silvic. Leafl. Dom. For. Serv.* No. 18, 1943. pp. 2. [Riding Mountain Forest Exp. Sta.]

From an examination of a number of bolts (3,520) of Aspen (*Populus tremuloides*) in Manitoba it was found that there is a considerable loss of wood in this species due to heart rot caused by *Fomes igniarius*. The loss increases with the age of the tree and, apart from this correlation, there are indications that the number of sound bolts decreases as the diameter of the tree increases.

44.3 : 12.26–8 : 12.21. ROY, T. C. **A root-rot disease of Mulberry plants (*Morus alba* L.).** *J. Indian bot. Soc.* 22, 1943 (27–35). [Bengal Agricultural Institute, Dacca.] L.S.

A root-rot disease of *Morus alba* in the Berhampur district of Bengal was found to be caused by the pathogenic fungus, *Diplodia morina* Syd. A brief description is given of the fungus and of the symptoms which it produces in the host plant, and observations are made on its growth and behaviour under different conditions of nutrition, temperature, and acidity or alkalinity. The fungus enters the host through an injured part and passes through the intercellular spaces to the phloem of the roots, whence it proceeds to block the xylem vessels, thereby cutting down the supply of soluble raw materials from the soil.

Since the growth of the fungus slows down and eventually ceases with increasing acidity or alkalinity, it may be possible effectively to check the spread of the disease by increasing the acidity or alkalinity of the soil, provided that such a procedure does not adversely affect the growth of the host.

44.3 : 12.26–8 : 12.21. ZENTMYER, G. A., HORSFALL, J. G., and WALLACE, P. P. **Logarithmic-probit relation of spore dosage and response in Dutch Elm disease.** *Abstr.* in *Phytopathology* 33, 1943 (1121).

In general, biological responses follow the logarithm of the dosage. This principle has been applied in studies (1) on the distance of local spread of the Dutch Elm disease, and (2) on spore dosage in relation to disease incidence and to amount of wood discoloured in inoculated Elms. In (1), the percentage of trees diseased, plotted as probits, decreased with the logarithm of the distance from a central source of

oculum. In (2), dosages of 10, 10^2, 10^3, 10^4, 10^5, and 10^6 spores per tree were injected into Elms; the disease sponse as percentage wilt per tree, plotted as probits or this 'all-or-none' type of reaction, increased irectly with the logarithm of the number of spores jected. In the graded type of response, the total ngth of wood showing vascular discoloration followed linear relation to the logarithm of the number of ores introduced into the tree. The spore-dosage ata also provided a sound explanation for the failure the expected percentage of Elms in heavily infected eas to show disease symptoms. The disease appantly will not build up sufficiently to develop symptoms hen the tree receives only a small dose of spores.

44.4. *Virus Diseases*

4.4 : 12.26–8. SWINGLE, R. U., TILFORD, P. E., and ISH, C. F. **A graft transmissible mosaic of American lm.** *Phytopathology* 33, 1943 (1196–1200).

The disease, which produces mottled foliage and ometimes a mild to moderate brooming of branches f infected Elms in parts of Ohio, Kentucky, Michigan nd New Jersey, is believed to be due to a virus and is ansmissible by means of bark or bud grafts, although ot grafts have so far produced no positive results. he disease appears not to be fatal, but it results in a adual decline in tree vigour, often accompanied by ie death of some of the branches, causing the inected trees to become unsightly. Its means of spread nder field conditions are not known, and attempts to ontrol the disease by fertilizing infected trees over 2- nd 3-year periods by the Aero-Fertil method (using 10–6–4 fertilizer), or by removing all branches bearing ottled foliage, have not been successful.

45. DAMAGE BY ANIMALS

45.1. *Mammals*

5.11 : 12.26–8 : 34.26 : 97.3 : 60.31.2. DAMBACH, C. A. **Comparative productiveness of adjacent grazed and ngrazed Sugar-Maple woods.** *J. For.* 42, 1944 (164–8).

A 5-year study of two adjacent stands of Sugar Maple (*Acer saccharum*) in Ohio, one of which was grazed while the other was protected from grazing, showed hat:—

(1) There was an annual loss of 0·3 trees per acre in he grazed wood compared with a gain of 4·2 trees per cre in the ungrazed wood.

(2) Production of Maple syrup from the ungrazed ood was greater on a comparable basis than that from he adjacent grazed tract.

(3) Seedlings averaging more than 50,000 per acre, ith a maximum diameter of 2 in. and a maximum eight of 23 ft., had developed in the ungrazed wood ollowing protection, whereas no young trees and few eedlings had developed in the grazed wood.

(4) Leaf litter and snowfall were more evenly disributed and more stable in the ungrazed than in the razed wood.

(5) During a severe cold wave, preceded by heavy now, the ground in part of the grazed wood froze to n average depth of 4·5 in. while no soil freezing ccurred in the ungrazed wood. A reduction in sap low was observed to correspond with areas of frozen oil in the early part of the season. *From author's ummary.*

5.12 (77.3–6) : 12.25 : 13.2. ALDOUS, C. M., and ALDOUS, S. E. **The snowshoe hare—a serious enemy of forest plantations.** *J. For.* 42, 1944 (88–94). [Intermountain Forest and Range Exp. Sta., Ogden, Utah.]

The snowshoe hare causes serious damage to coniferous plantations in the Lake States by nipping off terminal and lateral buds and stems, thus tending to deform the trees and retard growth. The injury becomes apparent with each cyclic increase of the hare, and the success of many plantations depends on the protection of seedlings during the time of high population peaks. Remedial measures are suggested, special emphasis being given to the importance of planting when the hare population is at a minimum, particularly in those areas having low brush cover and adjacent to swamps.

45.12 (79·6) : 12.25 : 13.2. STILLINGER, C. R. **Damage to conifers in northern Idaho by the Richardson red squirrel.** *J. For.* 42, 1944 (143–5). [U.S. Bureau of Entomology and Plant Quarantine.]

The Richardson red squirrel (*Tamiasciurus hudsonicus richardsoni*) has been observed to damage trees by barking and girdling in the forests of northern Idaho and northeastern Washington. The trees most commonly and severely attacked were Western Larch (*Larix occidentalis*) and Lodgepole Pine (*Pinus contorta*), preference being shown for dominant trees or those growing in the open. This species has habits similar to the eastern red squirrel including nipping twigs and small branches from conifers [cf. *For. Abstr.* 4 (128)]. It also eats the bark from the swollen part of the blister rust (*Cronartium ribicola*) canker on White Pine and so may somewhat retard the local spread of this disease.

45.3. *Insects*

45.3 : 13.2. OSSOWSKI, L. L. **The chemical destruction of forest pests.** *Repr.* from *Endeavour* 3 (9), 1944. pp. [6].

After a brief review of the damage done to European forests by insect pests from 1890 onwards, the author outlines the typical stages of development in insect outbreaks. The magnitude of an outbreak is controlled partly by climatic and other factors, but more particularly by insect parasites of the groups Ichneumonidae, Braconidae and Tachinidae.

Before chemical methods were adopted on a large scale, raking the surface of plantations for pupae, collecting moths, and painting tar rings on infested trees had been given extensive trials and had met with only moderate success, except in the case of tar used against the Pine moth.

The first trial of chemical methods was carried out in Bavaria against the nun moth in 1890, but as technical facilities for dusting with powder were lacking, the attempt was a failure. The first extensive experiment was carried out in the United States against *Ceratomia catalpa* on *Catalpa speciosa* with arsenates of lead (45·06 per cent. As_2O_5, and 54·84 per cent. PbO) dusted from an aeroplane. Owing to suitable weather conditions this test was completely successful.

Contact dusts were first used on a large scale in 1929–30. Since then they have been used under the trade names 'Foresit' and 'Choisit' in Poland and elsewhere, and have given a 98-per-cent. kill of hairless caterpillars. Later experiments (1932 and 1936 respectively) tested the efficacy of pyrethrum and dinitro-*o*-cresol preparations, both of which proved effective against hairy

caterpillars. Unfortunately the pyrethrine in pyrethrum decomposes very easily, while contact dusts based on dinitro-*o*-cresol are poisonous if absorbed into the bodies of men and animals, and cause 'burning' of young shoots of Spruce as well as of all broad-leaved trees.

Reference is made to the use of motor dusters, aeroplanes, autogyros and balloons for the application of insecticides.

45.3 : 13.2. SACHTLEBEN, H. Beiträge zur Kenntnis der Diprion-Parasiten. 1. Einleitung und Bemerkungen über einige *Diprion*-Tachinen. [**Contributions to the knowledge of the parasites of *Diprion*. 1. Introduction and remarks on some Tachinids from *Diprion*.**] *Arb. physiol. angew. Ent.* No. 9, 1942 (89–107). [G.] R.A.E. 32A (71).

45.3 : 13.2. OTTEN, E. 2. Chalcididen als *Diprion*-Parasiten. [**2. Chalcidoids as parasites of *Diprion*.**] *Arb. physiol. angew. Ent.* No. 9, 1942 (108–26). [G.] *Abstr.* in *Z. PflKrankh.* 53, 1943 (255–6). [G.] R.A.E. 32A (71).

Sachtleben discusses the taxonomy of *Ceromasia inclusa*, Htg., *Diplostichus janithrix*, Htg., *Sturmia inconspicua*, Mg., and *S. gilva* Htg., bred from *Diprion pini*, L., and allied sawflies, and gives a key to them.

Otten gives taxonomic and biological information on Chalcidoids bred in central Europe from *Diprion pini*, L., and related species. The parasites dealt with in this first part of his paper are *Microplectron fuscipenne*, Zett., *Amblymerus subfumatus*, Ratz., *Tritneptis klugi*, Ratz., *Monodontomerus obsoletus*, F., *M. dentipes*, Boh., *M. virens*, Thoms., *Dibrachys cavus*, Wlk., *Mormoniella vitripennis*, Wlk., *Habrocytus eucerus*, Ratz., *Dirhicnus magnicornis*, Thoms., *Eupelmus urozonus*, Dalm., *Eupelmella vesicularis*, Retz., *Eurytoma appendigaster*, Swed., *Pteromalus puparum*, L., *Pleurotropis* sp. and *Stenomalus* sp.

45.3 : 13.2. BOSQ, J. Un taladro dañino para nuestros frutales y forestales. [**A borer that damages fruit and forest trees.**] *Publ. misc. Minist. Agric. Argentina* No. 121, 1941 (1–8). [Span.] Biol. Abstr. 18 (5528).

This paper discusses the synonymy of *Praxithea derourei* and gives short descriptions of larva and adult. The borer attacks and often kills various fruit and forest trees. Pruning and injection into the larval tunnels of CS_2 or a 50-per-cent. mixture of this in petrol are suggested as control measures.

45.3 (77.6) : 13.2 : 44.3 : 12.21. HODSON, A. C., and CHRISTENSEN, C. M. **An evaluation of the economic importance of some Minnesota forest insect and fungus pests. Minnesota forest insect and disease survey—supplement I.** *Pap. Minn. agric. Exp. Sta. (sci. J. ser.)* No. 2068 [n.d.] pp. 24. [Univ. of Minnesota.]

This paper reports the type and extent of damage which may be expected from various species of forest insects and fungi, with particular reference to the activity of these pests under conditions such as obtain in Minnesota. The subject is dealt with under 5 main headings:—(1) Insects and fungi attacking seeds; (2) insects and fungi attacking seedlings; (3) transplant stock and natural reproduction (about 5–25 years); (4) insects and fungi attacking saplings, poles and mature trees; and (5) insects and fungi attacking decadent and dying trees. The third and fourth sections are further subdivided according to the part of the tree which is attacked.

The various species of insects and fungi are listed and discussed individually under the appropriate headings. Species of minor importance are included in the survey since they are often the object of speculation, but greatest attention is paid to pests of economic importance.

45.3 (77.6) : 13.2 : 44.3 : 12.21. HODSON, A. C., and CHRISTENSEN, C. M. **Minnesota forest insect and disease survey for 1942.** *Pap. Minn. agric. Exp. Sta. (sci. J. ser.)* No. 2084 [n.d.], pp. 8. [Univ. of Minnesota.]

After a brief review of the general entomological situation in Minnesota in 1942, the various forest tree species and their respective pests are discussed separately. Plantation insects were particularly conspicuous during the year, since many plantings had become old enough for infestation by the White Pine weevil, Pine shoot moths, the Pine tortoise scale, the Pitch Pine nodule-maker, and sawflies. Of these, the first was by far the most important. The most abundant and important cankerworm was the Jack Pine variety of the Spruce budworm.

Among the insects and diseases present in comparative abundance or causing severe injury in certain districts in 1942 were the Jack Pine budworm (*Cacoecia fumiferana*), the White Pine weevil (*Pissodes strobi*), and the Pine-Oak gall rust (*Cronartium cerebrum*) on Jack Pine; the White Pine aphid (*Cinara strobi*) on a 5-year-old White Pine plantation; the Zimmerman Pine moth (*Pinapestis zimmermani*) and the Pine gall weevil (*Podapion gallicola*) on mature Red Pine; the yellow-headed Spruce sawfly (*Pikonema alaskensis*) on White Spruce; the Eastern Larch beetle (*Dendroctonus simplex*) on Tamarack; the Birch sawfly (*Arge pectoralis*) and the Birch leaf-skeletonizer (*Bucculatrix canadensisella*) on Birch; the Aspen leaf-roller (*Sciaphila duplex*), the Poplar girdler (*Saperda concolor*), the black leaf and twig blight (*Fusicladium tremulae* (?)) and Poplar leaf rust (*Melampsora medusae*) on Poplar; Anthracnose (*Gloeosporium nervisequum*) and a wilt fungus on Oak; the Poplar and Willow borer (*Sternochetus lapathi*) on Willow; and a bacterial blight causing defoliation of Black Walnut in southern Minnesota.

45.3 : 12.25 : 12.14.7 : 13.2. CAMERON, A. E. **Insect pests of 1942.** *Trans. Highl. agric. Soc. Scotl.* 55 (5th ser.), 1943 (74–98). L.S.

Among the insects dealt with in this paper is the Spruce-cone Tortrix (*Cydia strobilella*). The various stages of its life history are briefly described, and the symptoms of infestation are indicated. This species has been recorded from Pine and Fir as well as from Spruce. The collection and destruction of immature fallen cones seems to offer the best prospects of control.

45.3 : 12.25 : 13.2. HOPPING, G. R., LEECH, H. B., and MORGAN, C. V. G. **The Larch sawfly, *Pristiphora erichsonii* (Hartig) in British Columbia, with special reference to the cocoon parasites, *Mesoleius tenthredinis* (Morley) and *Tritneptis klugii* (Ratzeburg).** *Sci. Agric.* 24, 1943 (53–63). [Forest Insect Laboratory, Vernon, B.C.] E.M.B.

The parasites, *Mesoleius tenthredinis* and *Tritneptis klugii* are widely distributed over the areas of British Columbia which are infested with the Larch sawfly, *Pristiphora erichsonii*, and are important factors in the control of this insect. *Bessa selecta*, a Tachinid, is a parasite of minor importance, while under certain climatic conditions the fungus, *Isaria farinosa*, is capable

of playing a useful part in the destruction of the sawfly. Predators are generally less effective than parasites.

Greatest damage has usually been caused by the sawfly during the first few years after it has become established; later on the zones of heavy defoliation tend to decrease both in number and size.

45.3 : 12.25 : 13.2. JOHNSTON, H. R. **Control of the Texas leaf-cutting ant with methyl bromide.** *J. For.* 42, 1944 (130–2). [U.S. Bureau of Entomology and Plant Quarantine, New Orleans.]

Tests reported in this article show that methyl bromide is effective and practical in the control of the Texas leaf-cutting ant (*Atta texana*) which is a serious pest of Pine seedlings in Texas and Louisiana. This chemical will replace carbon disulphide as a fumigant as it is cheaper and easier to apply, and is not inflammable or explosive; it is dangerous if inhaled and certain precautions must be taken in its use.

45.3 : 12.25 : 13.2. KRATOCHVÍL, J., and FARSKÝ, O. Třásněka modřínová (*Taeniothrips laricivorus* n. sp.) původcem odumírani modřínovych prytu. [**The Larch thrips, *Taeniothrips laricivorus* sp. n. as the cause of the dying of Larch shoots in Czechoslovakia.**] *Lesnická Práce* 20, 1941 (233–72). [Cz.] *Abstr.* in *Z. PflKrankh.* 53, 1943 (248–9). R.A.E. 32A (72).

45.3 : 12.25 : 13.2. MÜLLER, H. Die Douglasienwollaus, *Gilletteella cooleyi* Gill. und ihre Bekämpfung. [**The Douglas Fir woolly aphis, *Chermes cooleyi*, and its control.**] *Anz. Schädlingsk.* 17, 1941 (121–5). [G.] *Abstr.* in *Z. PflKrankh.* 53, 1943 (248). [G.] R.A.E. 32A (70).

Chermes (*Gilletteëlla*) *cooleyi*, Gill., was introduced into Germany on nursery plants of Douglas Fir (*Pseudotsuga taxifolia*) from Scotland after the cold winter of 1928–29, and is now widely distributed there, though it was checked to some extent by the severe winter of 1939–40. The regular holocyclic sequence of generations has now been proved to occur in Germany, with a gall-producing fundatrix and its progeny on certain species of Spruce, and hiemales, aestivales and winged sexuparae on Douglas Fir. Sprays, including one containing nicotine, alcohol and soap, proved effective in May and June. The regular production of sexual forms requires the destruction of the sexuparae by spraying in May and the removal of the galls on Spruce.

45.3 : 12.25–8 : 13.2. JONES, J. R. I. L. **Some food plants of Lepidopterous larvae. List No. 9.** *Proc. ent. Soc. B.C.* 40, 1943 (27). I.I.E.

The list includes *Acronicta* (*Apatela*) *funeralis* on Willow (*Salix scouleriana* and some ornamental species) and Carolina Poplar; *A. illita* on *Quercus robur* and *Alnus rubra*; *A. distans dolorosa* on *Alnus rubra*; *Halisidota maculata angulifera* on *Salix hookeriana* and *S. scouleriana*; *Hyphantria textor* on *Salix lasiandra*; *Malacosom*[*a*] *disstria erosa* on *Alnus rubra*; *M. pluvialis* on *Prunus emarginata*; *Nadata gibbosa oregonensis* on *Castanea* sp.; *Phoesia portlandia* on *Salix lasiandra*, *S. hookeriana*, *S. scouleriana*, *Populus trichocarpa* and *P. tremuloides*; *Pseudothyatira cymatophoroides* on *Crataegus oxyacantha*; *Scolioptery x libatrix* on *Salix lasiandra*, *S. scouleriana*, *Populus trichocarpa* and Lombardy Poplar; and *Schizura unicornis* on *Crataegus oxyacantha*.

45.3 : 12.26–8 (47.3) : 13.2. ARKHANGEL'SKIĬ, G. **Additional note on the Uzbek Cerambycid.** *Sprav. Vop. Karant. Rast.* No. 3, 1941 (10). [Russ.] R.A.E. 32A (102).

The so-called Uzbek or urban Cerambycid [*Aeolesthes sarta*, Solsky] has become prevalent in north-eastern Uzbekistan since 1924–25, when it was introduced with timber into Tashkent, and is now a serious pest of forest, orchard and ornamental trees. It is common on Elm, caused severe damage to Birch in 1939-40, and has recently been recorded as attacking Apricot. It increases rapidly, kills many trees each year, and has spread to the north and north-east of Tashkent into the adjoining area of Kazakstan. Quarantine measures should be enforced to prevent its introduction into the Caucasus with timber from central Asia.

45.3 : 12.26–8 (71.5–7) : 13.2. BALCH, R. E. **The die-back of Birch in the Maritime Region.** *Mimeo. Contrib. Div. Ent., Dep. Agric. Can.* No. 3, 1944. pp. 6 + tbl.

Since 1935, when many stands of Birch in the south-central region of New Brunswick were observed to be showing weak growth in the tops of the trees and an abnormal number of dead branches, the injury has become increasingly serious and has spread throughout the greater part of the Maritime region.

The cause of the die-back is not known, but it is often (although not invariably) associated with attack by the bronze Birch borer, *Agrilus anxius*. It appears that the reduced vigour of the trees, which makes them an easy prey to the borers, is largely the result of bad forest management, and in the present state of knowledge the only means of controlling the die-back seems to be by general stand improvement and salvage operations.

45.3 : 12.26–8 : 13.2. HARDY, G. A. **Field observations on the forest tent caterpillar, *Malacosoma disstria* var. *erosa* Stretch.** *Proc. ent. Soc. B.C.* 40, 1943 (28–9). [Provincial Museum, Victoria, B.C.] I.I.E.

General observations on *Malacosoma disstria* in the vicinity of Lac la Hache in the Caribou District of British Columbia in 1942. Most Aspens (*Populus tremuloides*) in the area were completely defoliated, while adjacent Willow, Alder, Birch, Dogwood and Rose also suffered. Buffalo Berry (*Shepherdia canadensis*) and Silverberry (*Elaeagnus argentea*) were completely ignored by the feeding caterpillars, but were freely employed to support their cocoons.

Examination of 100 cocoons gathered at random showed 44 to contain larvae that were parasitized. Twenty-six of the pupae were also parasitized, while the remaining 30 pupae appeared to be free from parasites.

45.3 : 12.26–8 : 13.2. HARRISON, J. W. H. ***Croesus septentrionalis* L. (Hym. Tenthredinidae) on Rowan (*Sorbus aucuparia* L.) in South Uist.** *Ent. mon. Mag.* 80, 1944 (69).

This sawfly, which in the Outer Hebrides seems normally attached to *Salix* spp. (particularly *S. atrocinerea*), is recorded as stripping Rowans in the Allt Volagir ravine in South Uist.

45.3 : 12.26–8 : 13.2. LEPAGE, H. S., and GIANNOTTI, O. Cochorilhas da jaboticabeira. [**Coccids infesting the Jaboticaba tree.**] *Biológico* 9 (7), 1943 (169–73 + plates). R.A.E. 32A (41–2).

The more important of the Coccids that infest the Jaboticaba tree [*Myrciaria jaboticaba*] in São Paulo are *Capulinia jaboticabae*, Iher., which is the commonest and most harmful of all and occurs under the bark of

the trunk and branches, and on the roots; *Saissetia discoides*, Hemp., which infests the trunks and is protected by ants; *C. crateraformans*, Hemp., *Takahashia pendens*, Fonseca, *Edwallia rugosa*, Hemp., *Pseudokermes nitens*, Ckll., and *Ceroplastes janeirensis*, Gray, which infest the twigs and thinner branches; and *Pulvinaria eugeniae*, Hemp., *Pseudococcus grandis*, Hemp., and *Mycetaspis personata*, Comst., which occur on the leaves. Pruning infested twigs controls many of these Coccids, and the others can be killed by a spray of oil emulsion, after scraping the trunk and branches to expose the protected forms.

45.3 (75.4) : 12.26–8 : 13.2. NEMETH, F. F. **Insect galls of West Virginia. II. Galls on *Solidago*, *Fraxinus*, *Acer*, *Cornus*, *Vaccinium*, *Rosa* and *Vitis*.** *Castanea* 8, 1943 (123–7).

Three galls on *Fraxinus*, three on *Acer* and one on *Cornus* are among the 14 types briefly described in this paper. The responsible gall-forming insects are *Cecidomyia pellex* (Ash bullet gall), *Contarinia canadensis* (Ash midrib gall), and *Eriophyes* sp. (Ash capsule gall) on *Fraxinus*; *Phyllocoptes aceris-crumena* (Maple spindle gall), *Dasyneura communis* (gouty vein gall), and *Cecidomyia occelaris* (Maple leaf spot) on *Acer*; and *Mycodiplosis alternata* (Dogwood club gall) on *Cornus*.

45.3 : 12.26–8 : 44.3. RUDOLPH, B. A. **A possible relationship between the Walnut erinose mite and Walnut blight.** *Science* 98, 1943 (430–1). [Deciduous Fruit Sta., Univ. of California, San Jose, Calif.] L.S.

In the summer of 1942 the Walnut blight organism, *Phytomonas juglandis*, which is annually responsible for huge and widespread losses of English walnuts, was successfully isolated from a Walnut erinose mite, *Eriophyes tristriatus* var. *erinea*. The mites, which are microscopic in size and present on Walnuts in very large numbers, were previously regarded as of no importance.

46. DAMAGE BY MAN

46 : 12.26–8. RUNYAN, C. R. **Injury to English Elms as a result of banding.** *For. Leaves* 33 (6), 1943 (11, 16). *Repr.* from *Arborist's News*, Nov., 1943.

Removal of the loose outer bark from a number of English Elms (*Ulmus procero*) in Cincinnati revealed that large areas of the inner bark had been killed and had disintegrated. Two of the trees examined had died as a result of girdling. In many of the damaged areas a mass of fibrous roots, originating from the healing cambium on the upper edge of the wound, extended through the decaying inner bark to the healthy tissues below. Injury was confined to areas which had formerly been banded with 'Tanglefoot' applied directly to the bark. No signs of injury had yet appeared as a result of banding during the current season.

The author assumes that the damage was caused either by shaving the bark, by application of 'Tanglefoot' direct to the bark, or by both. He makes practical suggestions for aiding the recovery of damaged trees.

5. MENSURATION. INCREMENT. YIELD

52. MEASUREMENT OF TREES AND TIMBER

52.1. *Diameter. Girth*

52.1 : 07.7. GRAVES, J. B. **The rigid diameter tape rule.** *J. For.* 42, 1944 (190–1).

This note describes the graduation and use of a rigid tape rule for measuring tree diameters, and lists the advantages of this instrument over the Biltmore stick. The application of the tape-rule principle to other instruments is also discussed.

52.4. *Measurement of Volume*

52.43.2 (76.9) : 31.8 : 61.31. GUSTAFSON, R. O. **Cull as determined from basal wounds in Kentucky Highlands timber.** *J. For.* 42, 1944 (181–4). [Univ. of Kentucky, Jackson, Ky.]

In this paper a method is described of using open basal wounds, caused chiefly by fire, as indicators of cull or degrade in merchantable standing timber, and the practical application of the method is illustrated with data collected in a survey undertaken in eastern Kentucky.

52.43.2. SIMMONS, F. C. **International log rule for long logs.** *J. For.* 42, 1944 (136–8). [U.S. Forest Service.]

The International ¼-in. log rule is authorized for use in U.S. national forests in scaling logs up to 20 ft. in length, longer logs being scaled as two or more separate logs, either by caliper measurements at arbitrarily determined points not more than 20 ft. apart, or by use of taper tables. This method has many disadvantages and in consequence International ¼-in. log-rule values for logs 20–48 ft. in length have been prepared for application to diameters measured at the mid point of the log. These values are tabulated for diameters inside bark of 8–32 in.

52.43.2 (71.1). **Cubic content log scale proposed for salvage operations.** *B.C. Lumberm.* 28 (1), 1944 (27–8).

At a recent meeting of the British Columbia Lumber and Shingle Manufacturers' Association, the Chief Forester of British Columbia outlined a proposal whereby the use of a cubic-content log scale would be made optional to that of the accepted bd.-ft. scale in the case of small-diameter logs, the value of which can be assessed more accurately by the cubic scale. The matter is being negotiated.

52.43.3. MEYER, W. H. **A method of volume-diameter ratios for board-foot volume tables.** *J. For.* 42, 1944 (185–9). [Yale Univ., New Haven, Conn.]

The new method described for using the volume-diameter ratio in the construction of board-foot volume tables makes use of the fundamental equation form $V/D = a + bD$, where V is volume in bd. ft., D is diameter, and a and b are coefficients to be determined. The apparent major advantage of this method is in reducing the relationship between board-foot volume, diameter, and merchantable length to three straight-line functions.

56. INCREMENT

56 (73). BEHRE, C. E. **Forest industry spreads dangerous assumptions on annual growth.** *J. For.* 42, 1944 (17–22). [U.S. Forest Service, Washington, D.C.]

Recently the forest industry in the United States has carried on a publicity campaign suggesting that the timber resource of that country is in a satisfactory

condition and that annual growth is steadily increasing. The present article deals with the pertinent facts on forest depletion, adequacy of growing stock, and growth. An evaluation of changes in annual growth since 1938 is attempted and the necessity for better management to maintain forest productivity is emphasized.

56 : 01.4. MEYER, H. A. **Methods of forest growth determination.** *Bull. Pa. agric. Exp. Sta.* No. 435, 1942. pp. 93.

This bulletin provides an account of standard methods of increment determination on the basis of increment borings and of successive stand inventories, and discusses the means of reducing the systematic errors involved, the evaluation of errors due to the influence of weather on current growth, and the working up of field data. Much useful information on developments in the use of statistical methods are given in the appendix.

56.02 : 07.7. DOUGLASS, A. E. **Notes on the technique of tree-ring analysis. IV and V. Practical instruments.** *Tree-ring Bull.* 10, 1943 (2–8, 10–6).

Information is given in these bulletins on the instruments and techniques recommended for use in tree-ring analysis. Part IV describes some collecting instruments (including the tubular borer and the Swedish increment borer), the use of the paraffin-gasoline treatment in field practice, the protection of increment cores, mounting and surfacing, the tools used in cross-dating, the Craighead-Douglass measuring instrument, and the photography of rings. Part V deals with curve plotting and cyclic analysis, cycleplots and the cycloscope, the latter being described and explained in some detail.

56.02 (72) : 11.21. SCHULMAN, E. **Dendrochronology in Mexico. I.** *Tree-ring Bull.* 10, 1944 (18–24).

The aim of dendrochronological studies now being carried out in Mexico is '(1) . . . to set up with a length and reliability as great as possible, a tree-ring index of variation in precipitation, temperature, river runoff, or any other element which may be related to variations in seasonal ring-width, and (2) to construct a master calendar or ring spectrum, which will make possible to precisely date the year of cutting of beams in ancient structures of Mexico'. The special problems of tree-ring chronology in Mexico are indicated, and recent work in Durango is outlined. Douglas Fir yields the most sensitive and consistent tree-ring records, but the Yellow Pines may also be cross-dated, although they are subject to false rings. Of the miscellaneous species examined in this area 'Oyamel' (*Abies* spp.) is too fast-growing and insensitive to offer much promise of use in chronology, 'Cedro blanco' (*Cupressus thurifera*?) is subject to erratic growth and supernumerary rings which destroy its significance as an index, while 'Ahuehuete' (*Taxodium mucronatum*), although showing serious irregularities in chronology, seems to deserve further study. Groups of Douglas Firs from areas in Durango 20 miles apart show essentially identical chronologies, but the general chronology of Durango is quite different from that of southern Arizona, as differences in climate might lead one to expect.

56.04 : 12.26–8 (77.2) : 60.31.2. DENUYL, D. **The growth of timber in Indiana farmwoods.** *J. For.* 42, 1944 (169–74).

Sample-plot studies were made to determine the volume growth in the mixed hardwood stands of the farm woodlands of Indiana, which comprise 1½ million acres of the 4 million acres of forest land in that State. The Oak/Hickory, Beech/Maple and upland swamp types are those mainly represented.

It was found that under average conditions the growth varies from about 100 to 350 bd. ft. per acre per year. On the basis of growth characteristics, frequency of occurrence, and relative commercial importance, Red Oak (*Quercus borealis*) is considered the best growing species with Elm (*Ulmus americana*) ranking second.

It is estimated that under proper management, which would exclude grazing, favour the better-growing species, and aim at a better distribution of diameter classes, the annual increment in mixed hardwood stands should be 300 bd. ft. or more per acre.

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

57.0 : 56.04 : 12.26–8 (74.8) : 12.19.2. MEYER, H. A., and STEVENSON, D. D. **The structure and growth of virgin Beech-Birch-Maple-Hemlock forests in northern Pennsylvania.** *J. agric. Res.* 67, 1943 (465–84). O.R.E.

By the use of the distribution function

$$df = k \cdot e^{-ax} \cdot dX$$

[where k and a are constants, X stands for diameter at breast height, and e for the base of the natural logarithms], the diameter distributions of various virgin stands of the Beech/Birch/Maple/Hemlock types have been compared statistically.

Analysis of growth showed that the percentage volume increment diminishes with increasing diameter from about 2·5 per cent. to 0·9 per cent. for Hemlock and from about 3·0 per cent. to 0·7 per cent. for hardwoods. The gross volume increment per acre ranges between 43·9 and 66·7 cu. ft., the average of all stands calipered being equal to 50·7 cu. ft. This gross increment is in part offset by the current average mortality. *From authors' summary.*

6. MANAGEMENT. WORKING PLANS. SURVEYS

60. GENERAL LAND MANAGEMENT

60.3. *Management of Different Classes of Forest*

60.31 (71.1) : 12.19.2 : 12.25 : 23.1 : 32.29.2 : 43.1. ALLEN, G. S. **Management recommendations for the Hemlock and associated forest types of the Juan de Fuca region of southwestern Vancouver Island.** *Res. Note B.C. For. Serv.* No. 11, 1944. pp. [ii] + 13.

Two broad silvicultural types are recognized in the Hemlock belt of the Juan de Fuca region of British Columbia:—(1) The open type, which consists of Cedar/Hemlock, Hemlock/Cedar, and Hemlock/Cedar/Balsam mixtures, is characterized by low volumes per acre, heavy underbrush, light advance reproduction, and heavy slash after logging; this type is found mainly along the lower levels or near the coast. (2) The dense type, which consists predominantly of Hemlock and/or Balsam, is characterized by higher volumes per acre, light underbrush, heavy advance reproduction, and lighter slash after logging; it is found inland from the coast on the upper slopes.

Silvicultural factors suggest that the open type can be improved by slash burning in order to decrease slash and underbrush, to favour regeneration, and to destroy the sparse advance reproduction that may perpetuate the type. While it is not considered necessary silviculturally to burn slash in the dense type, this may be necessary after logging on all or part of the area as a precaution against fire.

The planning of operations so as to favour natural regeneration over large areas involves:—(1) cutting towards the prevailing winds (towards the south in the autumn and the east in the spring); (2) leaving marginal timber standing to windward and within one mile of any cut-over area for a period of 2–5 years; (3) efficient fire protection.

60.31 (74.7) : 12.19.2 : 24 : 23.23. TRYON, H. H. **Practical forestry in the Hudson highlands.** *Black Rock For. Bull.* No. 12, 1943. pp. 50.

The purposes of this paper are (1) to indicate the apparent ecological trends of the region, (2) to outline what appear to be the generally sound management practices for forest lands similar to those under discussion, and (3) to emphasize the practical importance, for such management, of a thorough and accurate knowledge of local type successions.

The cover types of the forest may be classified broadly into (1) temporary associations of which there are seven, and (2) climax or near-climax types of which there are nine. Each of these sixteen types is described and discussed in some detail as regards occurrence, soil preference, commercial value, area occupied, utilization practice, suggestions for proper and profitable management, and the probable reaction to various methods of cutting.

60.31.1 (54.3) : 91.1 : 86. GRIFFITH, A. L. **Tour notes on the states of the Malwa Agency C.1.** [Forest Research Institute, Dehra Dun.] 1943. pp. i + 44.

Reserved forests covering 1,436 square miles of the Malwa States are of the Central Indian dry mixed deciduous type, chiefly Teak, mixed forests, and almost pure stands of *Hardwickia binata*, *Boswellia serrata* and *Acacia catechu* worked as coppice or coppice-with-standards on low rotations. Owing to fires, grazing, illicit felling, and abnormal cutting for war profits the forests are greatly degraded. Proposals are made for permanent working plans and a joint forest adviser with properly trained subordinate staff.

60.31.2 : 97.2. **Protection and care of farm woods.** *Conserv. Folder U.S. Dep. Agric.* No. 13 [n.d.] A.P.B.

Stress is laid on the potential value of farm woodlands in forming windbreaks, preventing erosion, improving the soil, and producing crops of saleable timber or fuelwood. Rules of management are given which, if observed, should increase the returns from such woodlands.

60.31.2 (74 : 75 : 76 : 77) : 97.2. COPE, J. A. **Farm forestry in the eastern United States: a study of methods used by public and private agencies to interest farmers in the proper management of their woodlands.** Charles Lathrop Pack Forestry Foundation, Washington, D.C. 1943. pp. 40. [New York State College of Agriculture, Ithaca, N.Y.]

Types of assistance afforded to farm forestry (education, free services, and direct subsidies) and the activities of Federal and State agencies and of private timber and wood-products enterprises that encourage farm forestry are discussed. There is also a chapter describing briefly a number of co-operative associations of farmers.

60.31.2 : 97.2. HINE, W. R. **Farm forestry.** *Sth. Lumberm.* 167 (2105), 1943 (231–4). [U.S. Forest Service, Atlanta, Ga.]

A programme for increased output of forest products from the farm woodlands in the southern States is being developed under the Farm Woodland Marketing Project. This paper outlines the work of the farm forester in advising woodland owners on all aspects of forest management.

60.31.2 (71.3–7) : 97.2 : 96.3. MARRITT, I. C. **Regulating the management of privately owned woodland.** With comments by K. B. Brown, W. M. Robertson, and R. Delisle. *For. Chron.* 19, 1943 (219–27). [Ontario Department of Lands and Forests.]

On account of the local shortage of fuelwood and timber, and also as a consequence of the education programme of governments, helped by newspapers, periodicals and private individuals, more attention has recently been given to woodlots by farmers in eastern Canada. The educational campaign for the preservation and better management of woodlots should be continued, but this alone will not have the desired result in all cases since owners have only a lifetime interest in their lands and are tempted to follow short-sighted management policies. Suitable regulations should be introduced, varying with the size and location of the woodlot because these factors determine the intensity of management which can economically be undertaken. As a result sub-marginal agricultural soils would be kept in timber and would produce tax revenue; local employment would be provided in the woods in winter; the wooded lands would help water conservation. The advantages to the farmer would be a supply of fuel and lumber, windbreaks for the protection of crops, high returns from sub-marginal soils, and, in individual cases, higher financial returns on woodlots.

Regulations advocated for general application in Ontario are criticized, and the importance of specific rules of management for each area is stressed. It is suggested that a County Commission to regulate management of woodlots would be preferable to the passing of regulations applying to all woodlots. The need for leadership in educating the public in management is emphasized.

Comments by K. B. Brown: The terms 'limits' and 'woodlots' are discussed, with the types of forestry they imply. The writer supports the idea of the county commission as the only practical solution of the problem, but considers that a first step should be to place the ideals of forestry before the public in order to obtain support for a suitable policy for regulation.

Comments by W. M. Robertson: Practical demonstrations of management are more effective than written propaganda, and these should aim at showing the improvement in terms of money. Suggested regulations are that (1) the woodlot be fenced; (2) the average cut should not be greater than the annual increment; (3) defective and wolf trees and dead and dying trees should be removed first.

Comments by R. Delisle: State interference would not have modified the management of certain large tracts of privately-owned forest in Quebec, but in other

areas would be in the general interest. Factors preventing intensive management of small tracts of forest are listed and the following suggestions are made for overcoming them: (1) Deal with the forest-fire problem; (2) make agriculture more profitable so that the farmer will not be so ready to exploit his woodlot unduly; (3) improve the lumber markets in order to give an incentive to good management of the woodlot; (4) make technical information available to the small owner through local visits by the extension forester to the woodlot; (5) further forestry through publicity and education.

60.31.2 : 97.2. ROBERTSON, W. M. **Some personal views concerning woodlot management.** *For. Chron.* 19, 1943 (235–6).

The author suggests that woodlot management in Canada should be the responsibility of the Government Extension Services. It should be their duty to survey the woodlots, estimate the growth rate and prepare a simple working plan for each interested woodlot owner. The plan should be a statement of the stock by species and broad age groups, and of the estimated increment. It should also include instructions for marking to improve quality and growth. In addition, a transect sample plot should be established in each woodlot to obtain detailed information on the development of the stand. The Extension Service should also be prepared to advise on planting problems.

60.31.2 (75.6 : 76.1–2 : 76.4–5) : 23.24. TOLER, B. **Tree farms in the South.** *Sth. Lumberm.* 167 (2105), 1943 (137–9).

In order to encourage sound forestry in the southern States, the Southern Pine Association inaugurated in 1942 a 'Tree Farms' programme, the primary objectives of which are:—(1) fire protection; (2) the use of approved forestry practices; (3) reforestation; (4) the dissemination of forest information. '"Tree Farm" is the name selected for areas, large or small, dedicated to the growing of forest crops for commercial purposes, protected and managed for continuous forest production.' Approximately 500 private forest owners controlling some five million acres of land have been designated Tree Farmers in the States of Alabama and Arkansas where the programme has been in force. It is now being extended to Mississippi, Texas and North Carolina.

60.31.2 : 12.26–8 : 98.1 (78.2). CROSBY, A. H. **Walnut for gunstocks.** *Soil Conserv.* 9, 1944 (149–51, 166).

Walnut is at present in great demand in the United States for gunstock material, but the scattered stands and diffused ownership have made buying costs high. The Soil Conservation Service is therefore fostering a farm forestry project in the Walnut country along the Missouri River in Nebraska whereby good management and systematic marketing are encouraged. In 1943 the production of Walnut logs from this project was more than 140 carloads, and at the same time thrifty young trees have been left with a view to future yields.

61. SURVEYING. MAPPING

61.4 : 07.7. SEIGWORTH, K. J. **Portable lookout mapping tower.** *J. For.* 42, 1944 (54–5). [Tennessee Valley Authority.]

A lookout mapping tower, 60 ft. high, that is built up of triangular steel sections 10 ft. long and is readily portable, is being used in the southeastern States for visible-area mapping in connexion with the development of fire-detection systems and the testing of tower sites.

65. DESCRIPTION OF GROWING STOCK

65.7 : 22.89 : 12.25 : 21.64 : 23.24.2 : 23.21 : 56. ADAMS, W. R., and CHAPMAN, G. L. **Competition in some coniferous plantations.** *Bull Vt. agric. Exp. Sta.* No. 489, 1942. pp. 26 + plates.

Plantations of Scots, Northern White, Jack, Red, and Pitch Pines (*Pinus sylvestris, P. strobus, P. banksiana, P. resinosa, P. rigida*) were established on poor eroded loamy sand scils in northwestern Vermont, at spacings of from 2 to 8 ft. apart to represent conditions in unmanaged, extensively managed and intensively managed stands.

The plantations were examined after 28 years. Survival in the dense 2-ft. spacing varied as follows:—(1) Some Scots Pine individuals assumed tolerance early but the remainder were so suppressed that less than one-third of them lived. (2) Approximately half of the Northern White Pine were eliminated as a result of the severe competition. (3) Jack Pine apparently withstood severe competition and stagnation longer than did Northern White or Scots Pine, but the survivors (55 per cent.) were spindly and weak. (4) Red Pine showed approximately 60-per-cent. survival with many small, weak trees about to be eliminated from the stand. (5) Pitch Pine grew uniformly slowly and the percentage of survival was approximately the same in dense and open plantations. This species appears to have a low volume production on the soil in question.

Mean measurements of diameter, height, crown width and crown depth show a satisfactory development for Jack, Red, and Northern White Pines in the more open stands, and it is apparent that for these species it is essential to reduce competition by adequate thinnings in order to produce crop trees of good form and maximum wood volume.

8. ADMINISTRATION

82. LABOUR QUESTIONS

82 (71.4). BENNETT, W. L. **How Quebec lumbermen have cut accidents.** *Pulp Paper Mag. Can.* 44, 1943 (946–50).

A discussion of the activities of the Quebec Pulp and Paper Safety Association, an organization of employers endeavouring to prevent accidents in the industry and acting as an intermediary between employers and the State Insurance Commission in the fixing of insurance rates, etc.

82 (73) : 33.17. **Accident rates in the woodworking industry, 1942.** *Sth. Lumberm.* 168 (2107), 1944 (56–7).

82 : 32.25 : 07.7. **Power-saw accidents: their circumstances and causes.** *Sth. Lumberm.* 167 (2103), 1943 (62–4).

82 : 60.31.2. REYNOLDS, R. R. **Employment requirements of well-managed timberland.** *Sth. Lumberm.* 167 (2105), 1943 (149–50). [Southern Forest Exp. Sta.]

With reference to conditions in the southern States.

82 : 92 (47.1). LÄHDE, A. **The living conditions of forest workers and of those engaged in floating timber.** *Silva fenn.* 51, 1940 (1–103). [Finn.g.] S.P.S.

By a law passed in Finland in 1928 employers are responsible for seeing that forest workers have homes built to certain specifications as to size and quality. The law does not regulate the supply of food but employers usually sell the necessary materials direct to the workers, and the prices and quality of the food have been standardized.

9. FOREST POLICY

9 (410) : 94.3 : 07.1. GREAT BRITAIN. **Post-war forest policy: private woodlands. Supplementary report by H.M. Forestry Commissioners.** H.M. Stationery Office, London. 1944. pp. 11.

Following the publication of H.M. Forestry Commissioners' Report on Post-War Forest Policy [cf. *For. Abstr.* 5 (211)] a conference was arranged between the Forestry Commissioners and representatives of various associations and societies to discuss the post-war treatment of private woodlands. Consideration was given to the basic principles of the policy of the Forestry Commissioners relating to private forestry, the scheme for the dedication of private woodlands, the forms and amounts of State assistance to be given to dedicated woodlands, and other related problems.

The following proposals for State assistance to dedicated woods, alternative, at the owner's option, to those proposed in the Forestry Commissioners' Report, were agreed on:—

(1) A planting grant of £7 10s. per acre for every acre planted or replanted, whether hardwoods or softwoods.

(2) Loans (in addition to (1)) up to an amount to be fixed with reference to individual circumstances, the rate of interest to be that at which the Forest Authority is financed plus a small operating charge.

(3) A maintenance grant for 15 years of 2*s.* 6*d.* per acre per annum on every acre planted and properly maintained.

(4) A maintenance grant for 15 years of 2*s.* 6*d.* per acre per annum from the date of dedication on all productive woodlands other than new plantations.

(5) Grants to be revised after 5 years on the basis of ascertained costs.

In the present report various other matters relating to private forestry are referred to briefly and appendixes deal with:—

(1) A report on woodland accounts, and

(2) The interpretation of sentences appearing in the Forestry Commissioners' Report.

9 (497.1) : 09.4. MARINOVIĆ, M. **Les tâches de l'économie forestière en Croatie. [Tasks of forest policy in Croatia.]** *Intersylva* 2, 1942 (489–507). [F.g.e.span.ital.] [Université, Zagreb.]

Croatia has a wooded surface of 3·68 million hectares, representing 36·4 per cent. of the country's territory and 0·56 hectare *per capita*. The great majority of the forests are in the interior of the country and are, for the most part, State property. The Jugoslav Forest Act of 1929 prescribed the establishment of management plans and the employment of trained foresters for forest property over 300 hectares. The present average increment of 2 cu. m. per hectare could probably be doubled by cultural measures. It is hoped to avoid the excessive exploitation which has taken place in the past by the rationalization of wood consumption. The whole wood industry is now State-controlled and the market regulated. *From English summary.*

9 (729.7). TRINIDAD AND TOBAGO. **Report of the agricultural policy of Trinidad and Tobago (Part I).** Govt. Printer, Trinidad and Tobago. (Second printing) 1943. pp. 142. A.P.B.

Appendix A of this report gives a detailed consideration of policy involved in the execution of the general forest policy of Trinidad and Tobago, which is set down under the seven main heads:—Forest reservation, forest management, utilization, research, education, private forestry, and land usage.

90. GENERAL PRINCIPLES OF FOREST POLICY

90 (73) : 60.31.2 : 94.3. WATTS, L. F. **A forest program to help sustain private enterprise.** *J. For.* 42, 1944 (81–4). [U.S. Forest Service, Washington, D.C.]

Increased public action towards the improvement of forestry practices and conditions in the United States is advocated, such action to include public co-operation with private enterprise, public acquisition of certain forest lands, and public regulation in order to maintain productivity of land to be cut over. Lines along which this programme might be developed are pointed out.

91. SOCIAL AND ECONOMIC SIGNIFICANCE OF THE FOREST

91.3. *Influence of the Forest on the Environment*

91.3 : 11.62 : 60.32. CAMSELL, C. **Forests and water.** *Pulp Paper Mag. Can.* 45, 1944 (86–9). [Department of Mines and Resources, Ottawa.]

The utility of forests in regulating stream flow and checking erosion is discussed in a general manner, and special stress is laid on the importance of the forests found on the eastern slopes of the Rocky Mountains in the Province of Alberta. In this area are the watersheds of the large rivers that water the western plains and provide them with electric power. The effectiveness of the large-scale irrigation works planned for Alberta and Saskatchewan will depend largely on the maintenance of the above-mentioned protection forests.

92. FOREST LAW

92 (68.9) : 91.1 : 94.3. NYASALAND. **Annual report of the Forestry Department for the year ended 31st December, 1942.** Govt. Printer, Zomba. 1943. pp. 15.

A new Forest Ordinance for Nyasaland was enacted in November, 1942. One of its main features is a provision for the delegation to Native Authorities of control of forest produce on certain lands and for the management of forest reserves, whether of reserved land or native trust land. The Ordinance also permits the application of Forest Rules to private estates on application by the registered owner or lessee. The major change in the new Forest Rules, under the Ordinance, relates to the privileges of natives in the cutting and taking of certain forest produce for specific uses or purposes (p. 12).

:2 (72). MEYER, H. A. **Mexican forest law of March. 943.** *J. For.* 42, 1944 (213–4).

A brief review is given of the main points in the new Mexican forest law, the purpose of which is 'to regulate, protect and promote the conservation, restoration and utilization of forests and forest products'.

92 (73). KINNEY, J. P. **The essentials of American timber law.** John Wiley and Sons, Inc., New York. Chapman and Hall, Ltd., London. 1917 with 1942 supplement. pp. xix + i + 279 + x + 48.

92 (79.5). ROGERS, N. S. **Development of Oregon forestry.** *W. Cst. Lumberm.* 70 (9), 1943 (48, 50).

A brief outline of the various laws that have affected the development of forestry in Oregon since the first work on forest fire protection was undertaken in 1904.

95. FOREST TAXATION

95.1 (73). PARKER, L. H. **Timber taxation.** *Sth. Lumberm.* 167 (2105), 1943 (264, 267–8, 270).

Inequalities and discriminations with respect to the present Federal income tax laws of the United States as applying to certain classes of timber owners and operators are summarized, and a method of remedying these conditions as proposed by the Forest Industries Committee is discussed in detail.

95.1 (77.5) : 92. TRENK, F. B. **Wisconsin's woodlot tax exemption law.** *Spec. Circ. Wis. Coll. Agric. Ext. Serv.* 1941. pp. 3.

96. POLICY REGARDING PROTECTION FOREST AND DEFORESTATION

96.3 : 11.62.11. STEBBING, E. P. **The forest as a factory.** *Nature, Lond.* 153, 1944 (243–5). [Univ. of Edinburgh.]

A pre-requisite of the successful organization of the forest on factory lines is the existence of an adequate forest staff with a working knowledge of the whole of the forest area of the country concerned, in order to avoid over-exploitation or devastation of the national forests. Owing to war conditions a great deal of over-exploitation is taking place, and examples are quoted of the damage resulting from such treatment in the United States and Alaska. The article stresses the importance of adequate supervision of fellings to avoid the exhaustion of the forest. The place of soil conservation schemes in preventing the spread of desert areas is also dealt with, and Government plans for the Sudan and Kenya covering the countries as a whole rather than locally receive special commendation.

96.5 (498) : 94.12. Ein Aufforstungsplan für Rumanien. [**An afforestation plan for Rumania.**] *Forschungsdienst* 16, 1943 (204). A.P.B.

The Rumanian Ministry of Agriculture has made plans for large-scale afforestation, particularly in the steppe region, in areas liable to flooding by the Danube, and on the extensive plains of the rivers Pruth, Sereth and Dniester. Bessarabia will receive first consideration since it is here that the need for afforestation is greatest, the area under forest being at present only about 4 per cent. in comparison with 21 per cent. in Rumania. Stress is also laid on the improvement of existing community forests.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

97.1 (51) : 34.2 : 12.26–8 : 11.62 : 11.4. RICHARDSON, H. L. **Soils and agriculture of Szechwan.** *Spec. Publ. nat. agric. Res. Bur. Chungking* No. 27, 1942. pp. 5 + 162 + 2 + maps. [E.chin.] A.P.B.

The following matters of forestry interest are discussed in this publication.

(1) Short notes on economic trees and shrubs in Szechwan (pp. 60–65 and 111–115). *Aleurites fordii* trees are grown on steep hillsides and edges of terraces where they assist soil conservation; Tung oil prospects in outside markets will be poor until extraction, grading and transport facilities are improved.

Fraxinus chinensis and *Ligustrum lucidum* are grown for the cultivation of the wax insect, *Coccus pela*, egg-masses of which are imported annually from Sichang or Yunnan. The writer considers the special properties of this wax would justify the formation of an organization for research and marketing to enable it to compete in the world market.

Varnishes are obtained from *Diospyros lotus*, *Rhus verniciflua* and Tung oil. Leaf galls of *Rhus javanica* are used for tanning. *Phyllostachys heteroclada*, abundant in the mountains between 500 and 2,000 m., is used in manufacturing a large amount of paper of coarse and poor quality, and seems to offer the best method of land utilization for steep hillsides.

Alnus cremastogyne, *Cunninghamia lanceolata* and *Pinus massoniana* are fairly extensively planted.

(2) A general report on erosion and problems of soil and water conservation in Szechwan (pp. 76–86 and 150–162). Loss of fertility and run-off is serious on all the upland soils, particularly in the yellow earth region; within the Red Basin the red granular clay-shales provide the most urgent soil conservation problem. As methods of erosion control and conservation, using local materials and suitable indigenous species of plants, are already understood in the Province, the need is largely one of organization and extension. The writer proposes experimental projects in two watersheds of Western Szechwan for run-off and erosion studies and practical conservation work.

(3) A general survey of the geology and soils of Szechwan Province, with map (pp. 15–44). The vertical zonation of six great soil groups is traced and these are further divided into suites, i.e. soils derived from the same or similar parent material, closely corresponding with the outcrop of geological formations. Data are tabulated for the pH reaction of numerous samples in all groups.

97.1 (67.6–8) : 13.2. BAX, S. N. **A practical policy for tsetse reclamation and field experiment. Pts. I–III.** *E. Afr. agric. J.* 9, 1943 (2–13, 83–7, 157–62 + map and plates). [Tsetse Research Station, Tanganyika Territory.]

This article gives an account of modern methods of eradicating the tsetse fly and the success achieved with them by the Tsetse Research Department in Tanganyika. It is shown to what extent reclamation is possible, with the knowledge at present available, for various types of vegetation and densities of population, and the prospect for large-scale reclamation is indicated. There are four main East African species of tsetse and six subsidiary ones, each having its own vegetational

preferences and special habits. Brief accounts of each are given.

97.2 : 12.26–8 : 34.25 : 34.27. MATTOON, H. G. **Farm use for tree crops.** *For. Leaves* 33 (6), 1943 (5–7, 10–1).

Farmers may substantially add to their incomes by establishing and utilizing farm woodlots for the production of fence posts, feed for stock, nut crops or Christmas trees. The growing of Honey Locusts on pastures is particularly recommended, since this species tends, on account of its light shade, to protect the grass roots from searing in hot dry weather. It also improves the soil through the fixation of free nitrogen, and produces a valuable stock feed in the form of its fruit pods which drop gradually over a period of 3–4 months. Black Walnut trees grown for nut production will ultimately offer an additional source of revenue in the form of timber.

97.2 (931) : 11.62.11 : 23.21 : 23.24 : 60.31.2. **Growing trees for timber on farms.** *Agric. Bull. Canterbury Agric. Coll., N.Z.* No. 176, 1944. pp. [4]. A.P.B.

By means of taxation allowances and the publication of numerous bulletins on tree culture, the New Zealand State Forest Service has encouraged the planting of trees on farms. This bulletin discusses the rôle of trees in the control of weeds and in the checking of erosion in hill country, on river banks and in areas exposed to destructive winds. A list is given of species that may prove suitable for farm planting. These include Insignis Pine (*Pinus radiata*), Douglas Fir, Macrocarpa (*Cupressus macrocarpa*?), Californian Redwood, Maritime Pine (*Pinus pinaster*), Corsican Pine (*P. laricio*), Western Yellow Pine (*P. ponderosa*), Poplars (*Populus alba* and *P. nigra*), and various species of *Eucalyptus*. Methods of planting are discussed and notes are given on fencing, fire protection and management.

97.3 (494). JANETT, A. Über die Regelung von Wald und Weide. Unter besonderer Berücksichtigung der Verhältnisse in Graubünden. **[On forest and pasture regulations. With particular reference to conditions in Graubünden.]** *Schweiz. Z. Forstw.* 94, 1943 (105–17). [G.]

A review of the development of regulations in the Canton of Graubünden with reference to the use of forested areas for the grazing of livestock. Forest grazing takes place now only where no other form of pasturage is available; it cannot be entirely eliminated since the livelihood of peasant communities in the mountains depends largely upon the grazing for at least part of the year in areas such as community forests.

The author recommends, wherever possible, the segregation of forest and pasture, and stresses the need for increasing the productiveness of existing pastures.

97.3 (75) : 34.21 : 60.3 : 43.3. BISWELL, H. H., FOSTER, J. E., and SOUTHWELL, B. L. **Grazing in cutover Pine forests of the southeast.** *J. For.* 42, 1944 (195–8).

A high percentage of the year-long grazing of beef cattle in the Coastal Plain of North Carolina and Georgia takes place on forest land, mainly cut-over Pine forest. In this paper two of the main native forage types in these forests are described—the reed (*Arundinaria tecta*) and wiregrass forage types—and some of the problems concerned in their management for grazing and forest production are discussed briefly.

97.3 (76) : 60.31. CAMPBELL, R. S. **Trees, grass and cattle in the Gulf States.** *Sth. Lumberm.* 167 (2105), 1943 (171–3). [Southern Forest Exp. Sta.]

Problems relating to the management of range lands of the southern States for the production of both livestock and forests are discussed briefly. It is concluded that, except possibly in the case of some small farm woodlots, such management is feasible where land is under proper control.

98. THE TIMBER MARKET

98.1 : 33.3. **Wood as an engineering material.** *Engineer, Lond.* 177 (4599), 1944 (170–1).

The Timber Development Association's notes disproving the possibility of a timber famine are quoted [cf. *For. Abstr.* 6 (6)], and it is suggested that both mechanical and civil, and even electrical, engineers, should study recent developments in timber technology, since timber will in the future probably be widely used in treated forms rather than in its natural state.

98.1 : 33.52 : 12.26–8. CHATURVEDI, M. D. **Outturn of Sal.** With note by the Statistical Assistant Silviculturist, Dehra Dun. *Indian For.* 70, 1944 (11–4).

Advantage was taken of special defence markings in 1941–42 to calculate the outturn of *Shorea robusta* in three compartments of the Damar type at Nakha Tal, chiefly in terms of standard and broad gauge sleepers. The rather high outturn of sawn material shown may have been due to the defence fellings being the pick of the stand and standards of conversion being more intensive than those on which the figures in Howard's Pocket Book are based.

98.1 (410). **Timber supply position.** *Timb. Tr. J.* 167, 1943 (531).

At the end of 1943 softwood supplies in Great Britain were in a better position than they had been since the beginning of the war. This was due to a reduced demand earlier in the year, to a high production of home-grown timber and to an improvement in shipping facilities during the previous summer. The fact that two-thirds of the softwoods in England, Wales and Scotland have now been felled points to an early drop in production of home-grown timber.

The production of hardwoods in Great Britain in 1943 will prove a record and the bulk of requirements were met with home-grown timber.

98.1 (485) : 33.06 : 65. En vedskogsinventering. **[A fuelwood inventory survey.]** *Skogsägaren* 18, 1942 (107–9). [Sw.]

A report on the fuelwood inventory survey carried out in southern Sweden during the autumn of 1941 under the direction of the State Forest Survey Board was submitted to the Fuel Commission in the spring of 1942. [Cf. *For. Abstr.* 5 (214).] The inventory related to the counties of Älvsborg, Östergotland and Kalmar.

The principal aim of the survey was to obtain information on the amount of wood that could be removed from these counties annually, taking into consideration the requirements of forest improvement, and to serve as a guide in estimating annual fuelwood allotments.

The result of the valuation showed that in all counties the supply of timber 10 cm. d.b.h. and up had risen during the period since the first State Forest Survey. The increase was greatest in the county of Älvsborg, and for the species Spruce.

Comparison with data from the earlier survey showed that the volume increase for Pine was in the larger diameter classes from 20 cm. d.b.h., upwards, while that

Spruce was distributed over all diameter classes. ere was a marked decrease in volume for all species trees over 45 cm. d.b.h.

Of special interest is the Board's pronouncement that supply of timber in all the counties investigated had reased since the previous State Forest Survey, the atest increase being shown by the county with the allest supply of timber. This agrees with the neral opinion of the results of work in forest improvent during the last 20 years. R. P. J.

.1 (72 : 728 : 8). **Timber of Latin America: prospects development.** *Timberman* 45 (2), 1943–44 (12–3, 50,).

New timber species and sources of timber supplies e being found in Central and South America. The sition in a number of these countries is reviewed iefly. Lack of dependable nomenclature, lack of curate knowledge on technical qualities, and lack of pendable supplies have been handicaps to the velopment of timbers from the American tropics in e past; with co-operative planning these difficulties ay be overcome.

.1 (68). MacGillivray, J. C. **South Africa's wood pply.** *B. C. Lumberm.* 27 (9), 1943 (30–1, 39).

Cf. *For. Abstr.* 5 (156). It is unlikely that timber pplies will be available for export from Europe to outh Africa for some years after the war. For many urposes the African grown and manufactured timber ill meet requirements if properly seasoned and nished, but, owing to climatic conditions, the general uality of softwoods grown in South Africa tends to be ediocre. Under normal conditions these will not ntirely displace the imported timber which, after the ar, will probably have to be obtained from North merica.

.1 (73) : 33.02. **U.S. pulpwood situation. The statistil background of the paper industry's No. 1 problem.** *ulp Paper Mag. Can.* 45, 1944 (93–4).

On a conservative estimate, at least 20 per cent. less ulpwood was cut in the United States in 1943 than in 942.

.1 (73) : 96.3. Watts, L. F. **The need for the nservation of our forests.** *J. For.* 42, 1944 (108–14). J.S. Forest Service, Washington, D.C.]

In considering the suggestion that in normal times the ain problem of forestry in the United States is one of nber abundance rather than timber famine the author xamines the position with regard to timber supplies each of the important forest regions of the country, nd concludes that only on the West Coast is there a ossibility of a surplus supply and this is local in charac- r. It is emphasized that much of the old-growth nber of the Pacific Northwest is of doubtful accessi- lity.

It is suggested that the progressive forestry proammes of many private companies indicate a response a regional or national timber scarcity rather than a rplus.

A comprehensive legislative charter providing for e regulation of practices on private forest land, nproved forest protection, increased public aid to ivate forest management, and the public acquisition certain types of forest lands is suggested as a basis for ost-war action in forestry.

98.1 (77.4) : 97.3. Holcomb, C., and Herbert, P. A. **Availability of farm timber for Michigan's wood-using industry.** *Quart. Bull. Mich. agric. Exp. Sta.* 25, 1943 (356–60).

The forest lands of southern Michigan would, if properly managed, be sufficient to supply present Michigan wood-using industries with hardwood, whereas more than half the supply is now imported. Productivity of forests has been reduced by over-cutting and excessive grazing, leaving a large percentage of relatively small or inferior trees. Although a considerable volume of usable timber remains, its utilization should be spread over a long period of years. It is calculated that an annual harvest of about 90 billion bd. ft. from southern Michigan would permit gradual improvement in quality and productivity of the forests. This amount is less than half the depletion for 1939, an indication of the urgent need for reducing the rate of cutting of all important species.

98.1 : 12.26–8 (86) : 31.0 : 33.0. Banda, C. F. **Ecuador's Balsa.** *Bull. Pan Amer. Union* 77 (11), 1943 (626–30). *Abstr.* in *Trop. Woods* No. 77, 1944 (41).

Ecuador supplied an average of 99 per cent. of the Balsa (*Ochroma*) used by the United States and Great Britain during the period 1935–41.

98.1 (942 : 943) : 12.25–8 : 38.1. **Queensland and South Australian Forestry Chiefs before Commonwealth Housing Commission.** *Aust. Timb. J.* 9, 1943 (348, 351, 360).

Notes from evidence presented by the Queensland Director of Forests and the South Australian Conservator of Forests. In Queensland, Hoop Pine (*Araucaria cunninghamii*) and Bunya Pine (*A. bidwilli*) stands are rapidly nearing exhaustion, a decline of output is anticipated for Kauri Pine (*Agathis* spp.), while the output of Cypress Pine (*Callitris* spp.) can probably be maintained, and possibly increased; it is doubtful whether hardwood production can be maintained. The production of 'cabinet timbers and secondary species', the bulk of which is obtained from North Queensland, can probably be increased with the proper development of that region. Virtually the only building timber produced in South Australia is Radiata Pine (*Pinus radiata*) milled by the Woods and Forests Department; here considerable increases in production are expected.

98.1 (945) : 43.3. [Galbraith, A. V.] **Prospective post-war yield from Victorian forests.** *Aust. Timb. J.* 9, 1943 (378–9, 381–3).

Owing to the very heavy fires that occurred in 1939 and to the effects of war-time conditions, a decrease in the supply of saw timber from accessible districts must be expected; in fact, such a decrease is already making itself felt. The opening up of less accessible areas, notably those carrying high-quality *Eucalyptus gigantea* timber, is an urgent necessity.

98.1–2 (97) : 33.15 : 33.32 : 34.6. Robertson, W. A. **Forest products. (1) Timber.** *J. roy. Soc. Arts* 92, 1944 (94–101). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

This article describes changes which are taking place in the utilization of timber and discusses the probable effects of such changes on the value of forests in the British Empire. Softwoods have hitherto dominated the timber-using industries, and the only country in the Empire with an exportable surplus of softwoods is Canada. Otherwise the bulk of the forests lie in the

tropics or sub-tropics and are predominantly hardwood; the species grow in mixed stands, and the character of the timber varies widely. Only a small number of these species are in regular demand in this country; a few others are important in the country of origin. As a consequence a great volume of material is wasted at present. The changing methods of utilization should enable this volume to be used, and, in addition to solving the supply problem in Britain, would enable secondary industries to be developed in the Colonies.

The first change dealt with is lamination. By this means a stronger product than the original timber is obtained, shrinkage and expansion are reduced, and effective use is made of short lengths of timber. In addition, there is a reduction of loss in converting the log, 60 per cent. of the round log being usable as against 45 per cent. by sawing. More labour is entailed in the manufacture of laminated wood, but this may be a necessary consequence of the lower quality of wood that is to be expected in the future. A great advantage of lamination is that hardwoods are as suitable for use as softwoods.

The other great change is in chemical utilization. The paper industry uses only the cellulose substance of the wood, but experiments are being made in the use of lignin, particularly in the manufacture of synthetic plastics. The rayon industry also uses wood cellulose, and new processes should make it increasingly easy to substitute hardwoods for softwoods.

98.2 : 12.26–8. **Balsa wood in industry.** *Mech. World* 114, 1943 (657).

98.2 (71). LeClair, W. J. **Canada's lumber industry in the war effort.** *Sth. Lumberm.* 167 (2105), 1943 (197–9).

98.2 (73) : 31 : 33.0. Hess, R. W. **The wood industry begins to waken.** *Trop. Woods* No. 76, 1943 (1–11).

An outline of the many developments which have taken place recently in the field of wood utilization, notably in the plywood industry, in wood seasoning equipment, synthetic resin adhesives, resin impregnation, derived products and plastics. New kinds of equipment have appeared along with the new processes, and improvements in fabrication methods and new wood materials have given new opportunities for the designer. Some of the future trends in wood utilization are indicated. Only full use of the new products and new methods can support full forest-crop production and successfully meet the competition of other materials.

98.2–3 (97) : 32 : 07.2. Oliphant, J. N. **Development of trade in colonial timbers. Importance of research into problems of production, marketing and forest engineering.** *Repr.* from *Crown Colonist* March, 1944. pp. 3.

The article emphasizes the need for production and processing research in the Colonies in order to enlarge the range of marketable products from the tropical forests. Research carried out in the United Kingdom is not always satisfactory owing to deterioration of the test material in transit. Full-scale research on the spot would produce reliable data on potential products, particularly on the cost of their production, and such information is needed for the purpose of market research.

It is suggested that the facilities provided for production research in the Colonies could be used also for the training of local personnel for the sawmill and wood-using industries. For this purpose the plant and equipment should be simple and capable of being operated by local labour.

It is immaterial whether the research is undertaken by the Government or privately, provided the results are made free to all. Many of the problems are concerned with mechanical engineering, and an increase in the number of forest engineers is needed.

98.3 (77.4) : 60.31.2. Holcomb, C., and Herbert, P. A. **Marketing farm timber in Michigan.** *Quart. Bull. Mich. agric. Exp. Sta.* 25, 1943 (350–5).

The marketing problems of Michigan farmers are discussed, and reasons suggested for the low prices obtained for their timber. Among these are the poor quality of the timber owing to the depleted state of the woodlands, and the farmer's weak position as a seller in a buyer's market. In addition the timber is frequently badly handled by local sawmill operators, is improperly seasoned, and not acceptable to manufacturers. It is suggested that the farmer should take a more active interest in the processing and marketing of his timber, and not sell on the basis of a single offer.

98.3 (77.8) : 60.31.2 : 32.3. Peck, R. H., Sechrist, W. C., and Leach, C. W. **Marketing Missouri farm timber crops.** *Bull. Mo. agric. Exp. Sta.* No. 460, 1943. pp. 43.

A bulletin for the benefit of local farmers on logging, marketing, and related matters.

98.3 : 12.25 (944) : 71. **Economic base. Excerpt from evidence given before the Rural Reconstruction Commission by Mr. E. H. F. Swain, N.S.W. Commissioner for Forests.** *Aust. Timb. J.* 9, 1943 (437, 439, 442).

The article describes the operations of the Queensland Forest Service in a successful attempt to place the country's timber industry on an economic footing. By fixing the market price for Hoop Pine (*Araucaria cunninghamii*) at the Melbourne parity, which was almost double the local price, forest management became profitable, new wood-using industries were established, and local woods were popularised. Other experiments undertaken by the Forest Service are described, with an account of the economic advantages resulting from them.

NOTES FROM THE DAILY AND THE NON-TECHNICAL PRESS

References: 1. *Domestic Commerce*, Washington. 2. *Foreign Commerce Weekly*, Washington. 3. *Noticioso*, Buenos Aires. 4. *Pester Lloyd*, Budapest. 5. *Siglo*, Bogotá. 6. *Völkischer Beobachter*, Berlin. The numbers in brackets indicate the reference number and the date of publication of the newspapers and journals to which the notations refer.

Argentina. The *Noticioso* of 11.1.43 reports the speech delivered by the Minister of Agriculture (Dr. Amadeo y Videla) at the opening of the first Argentinian forestry exhibition, which was organized with the aim of stimulating public interest in forestry and in the use of forest products. It is stated that the forests of Argentina cover some 100 million ha., or one-fifth of the land area. There are more than a thousand timber species, of which 458 attain a diameter of over 20 cm. However, only 43 species are commonly used by the sawmills of the larger towns. Despite the great forest wealth of the country, imports of forest produce have greatly exceeded exports. There is an obvious need for developing and protecting the forest resources. The war has stimulated the development of the timber and wood-products industries, and plans are being made for increased production of pulp and paper and of plywood. Argentinian Quebracho Colorado extract supplies 63 per cent. of the world's tannin requirements, and it is essential to conserve and perpetuate the forest resource yielding this material. Charcoal production, which, on an estimate, amounts to 700,000 tons per annum, has benefited considerably as a result of price regulation under the newly-created Corporación Argentina de Productores de Carbón Vegetal.

Belgian Congo. The timber industry in Maniema has been working at full capacity to meet heavy war-time demands. Production increased rapidly in response to a Government request for railway sleepers that were urgently needed for military purposes in the Near East. Shortages of labour, lorries, and equipment were overcome, and the material delivered. Increased timber requirements for Congo and Rhodesian industries were also expected (2; 29.1.44).

Bulgaria. Steps are being taken by the Bureau of Forestry to increase the number of forest-tree nurseries. During 1943 the production of plants reached a record total of 215 million, of which 75 million were conifers and 140 million deciduous plants. This is said to be sufficient to meet domestic requirements (2; 29.1.44).

Chile. More than a million Pine seedlings were distributed free of charge in 1943 by the Chilean Directorate General of Agriculture, and a large quantity of seed was made available. The planting will be done in eight provinces of south-central Chile (2; 19.2.44).

Colombia. The natural forests of Colombia comprise 15,753,700 ha., covering one-fifth of the national territory. A recent Government afforestation plan calls for the planting of 10,705 ha., using 36½ million trees (5; 26.4.43). Several projects for the development of Colombia's forest resources have been postponed indefinitely by the Institute of Industrial Development. The Institute reports that the forests cannot be developed properly until a system of improved communications is established. Labour shortages also present a problem.

Balsa is available in large quantities on the west coast of Colombia and is also found in the Atlantic coastal areas. Sawmills have been equipped to handle this timber, and active shipping began in 1943. It is expected that the 1944 exports will show a large increase. Colombian Albarco (*Cariniana pyriformis*) can in some cases be substituted for Mahogany. A substantial part of the amount under contract in 1943 was shipped. The production outlook for this year is somewhat doubtful as sawmills have had difficulties in handling Albarco because of its hardness and the need for special machinery to work it (2; 1.4.44).

Costa Rica. War-time demands have brought about a great expansion of the Balsa industry. The new finishing plant of the International Balsa Company, at Limon, has been completed at a cost of $150,000. Another sawmill has recently been established by the Company, and two additional mills are expected to start operations. All these plants are located in Limon Province. Balsa is also being purchased from mills in various districts of the lowlands of eastern Costa Rica. The finishing plant in Limon is to be used in drying the Balsa from all the mills (2; 1.1.44).

Czechoslovakia. According to European press reports, Czechoslovakia's timber output increased from 5 million cu. m. in 1941 to 5·3 million cu. m. in 1942, softwoods accounting for 2·8 million cu. m. Pitprop production has been sufficient to allow of the export of two-thirds of the total output. Large amounts of wood are used as fuel-wood, charcoal, and for various industrial purposes. There are now 29 large-size, 97 medium-size, and 270 small sawmills in the country (2; 11.12.43).

It is reported that timber products now account for approximately 45 per cent. of Czechoslovakia's export trade. Germany has been the principal buyer, taking 65 per cent. of the total export of wood. Italy was an important customer in 1942, and Hungary and Switzerland have purchased fairly large amounts (2; 22.1.44).

Denmark. Denmark's total cut during the 1942–43 season amounted to 2,455,000 cu. m., of which more than half—1,285,000 cu. m.—was for fuel. This is a slight decrease from 1941–42, when a total of 2,483,000 cu. m. was felled—1,300,000 cu. m. for fuel, and 1,183,000 cu. m. for timber. The normal cut is 1,900,000 cu. m. (2; 4.3.44).

Finland. Under the felling programme drawn up by the Finnish Ministry of Supply for the winter of 1943–44, the cut of logs was fixed at 205 million cu. ft., that of fuelwood at 18·5 million cu. m., and that of other round timber, chiefly pulpwood, at 7 million cu. m. The total is slightly less than in the preceding winter, particularly for fuelwood, the amount of which was set at 23 million cu. m. in 1942–43. This reduction is due chiefly to an

abundant water supply, which makes it possible to furnish industries with more hydro-electric power. However, the Ministry has emphasized the need for establishing a reserve of fuel, so that requirements can be met even if coal imports should cease. It is suggested that the reserve be in the form of pulpwood stocks, which could be used in the cellulose industries if coal shipments continue. Out of the total of 205 million cu. ft. of logs, it is hoped to obtain 108·1 million cu. ft. from private, 8·9 million cu. ft. from municipal, 40 million cu. ft. from company, and 48 million cu. ft. from State forests. Private forests are expected to furnish 12·2 million cu. m. of fuelwood (2; 19.2.44).

Germany. The annual demand for nursery plants in the Reich is estimated at 2·7 milliard; of this 1·8 milliard is produced by commercial nurseries, and the remainder by State-forest and various other nurseries (6; 13.2.44).

Hungary. According to the German Press, plans are being made in Hungary for a post-war forestry programme that involves an expenditure of 72 million Pengös.[1] Considerable attention is to be given to the provision of additional roads and rail-transport facilities in forest regions. Afforestation is planned for a number of districts, public forests are to be planted in the Maszad region and other areas, and nurseries are to be established. It is also planned to construct nine sawmills and several other timber-processing plants, including a veneer factory (2; 11.3.44).

Latin America (chiefly Costa Rica, Ecuador, and Mexico). From an article on the future of forestry in Latin America by the Office of the Coordinater of Inter-American Affairs (2; 18.12.43):—Recently surveys lasting four months each were made by two groups of United States forestry experts, one working in Central America and the other on the west coast of South America. Dr. Arthur Bevan, formerly of the Tropical Forest Experiment Station of Puerto Rico, who headed the party to Central America, reported *inter alia* the discovery of an almost pure Oak forest 50 miles south of San Jose, Costa Rica. This forest, which extends for several miles along a mountain ridge, has trees up to 8 ft. in diameter with stems up to 80 ft. high. It is estimated that in some parts this forest will yield 60,000 bd. ft. of timber to the acre; the trees are thought to be among the largest of their kind in the world. Wood samples sent to the U.S. Forest Products Laboratory showed a specific gravity of 0·74, or 25 per cent. greater than that of White Oak. The existence of this forest was unknown until construction of the Pan-American Highway through this region was started. Its discovery suggests that there may be other equally rich stands as yet undiscovered in these mountains. The party brought back some 50 samples of Central-American woods that appear promising from an industrial point of view. A previously unknown variety of *Vantanea* was identified: it is an excellent timber for heavy construction (bridges, docks, etc.). Business men of Costa Rica are planning logging operations and the establishment of sawmills, veneer factories, and other wood-working plants as soon as machinery becomes available.

The foresters visiting the Republics on the west coast of South America reported the finding of types of timber that may possibly be used as substitutes for Teak in decking and other marine construction; also several varieties of Balsa, and certain types of very hard wood that are possible substitutes for Lignum Vitae for bearings in motor boats and other small craft. This party gave particular attention to the Balsa of Ecuador. Some 25 sawmills, most of them cutting Balsa, are now operating in and around Guayaquil, and several more are found in the Esmeraldas Province. The new 205-mile highway under construction between Quito and the port of Esmeraldas will open up regions rich in timber. Professor M. Acosta Solis, Director of the Ecuadoran Institute of Natural Science, has identified 115 commercially valuable trees found in Esmeraldas Province alone, and he points out that his list is by no means complete.

Recent reports from Mexico reveal that new and vast resources of timber have been located there, including valuable stands of Ash, Pine, and White Oak. The Ash, which is of excellent quality, is found in the higher altitudes of the Guadalajara region and on the Pacific slopes in Jalisco and Michoacan.

Up to now logging operations have touched only the fringe of the great South-American forests; this is due to lack of transportation facilities, of machinery, and of an adequate market. It is thought that these conditions are likely to change in the post-war period. Some indication of how future enterprises may operate is found in the very modern milling and lumbering operations of the Astoria Lumber Company, now marketing Mahogany and Cedar from the region around Iquitos, Peru. This is one of the largest foreign-owned mills in South America, with a capacity of 20,000 bd. ft. per day. The Company is planting Mahogany on areas that have been cut over.

Roumania. Production of wood has shown a downward trend since 1940. In 1942–43 2·6 million cu. m. of timber and 570,000 wagons of firewood were produced, as against 3·4 million cu. m. and 638,000 wagons in 1940–41 (4; 1.1.44).

Sweden. Sweden's timber exports have declined during the war period. In 1939 they amounted to 750,000 standards, and in 1940, 1941, and 1942 to 490,000, 475,000, and 355,000 standards, respectively. Besides the reduction in quantity, there has been a considerable lowering of the quality of the timber sold, especially of that sold to Germany. Before the war, planed-timber and box-shook exports comprised 22 and 7 per cent. of total shipments, respectively; they now amount to only 6 and 4 per cent. Since the domestic market has not been able to absorb the surplus previously sold abroad, the production of these goods has been reduced substantially.

Special interest attaches to the fact that in recent purchases of Swedish timber by Spain the delivery was made by rail, despite the present heavy strain on the European railway system. The rail shipment of several thousand standards of timber during the last year reveals Spain's great need for timber. Spain was a buyer of Swedish and Finnish timber in former years, and before the Civil War imported annually about 60,000 standards from Sweden and a smaller amount from Finland.

Markets for Swedish sawn goods were very limited in 1943. Germany, the principal buyer, took less than in

[1] The Pengö was stable in 1937 at 16·50 = £1.

1942, and Denmark, the next largest customer since the war, was unable to import as much as in previous years. The overseas market outside the Baltic was negligible (2; 18.3.44).

Swedish manufacturers of wood-distillation products have organized themselves into a National Association of Wood Distillers. Before the war the output of these materials was small, but after imports were cut off the need for various tar-based substitute products increased rapidly, and steps were taken to stimulate large-scale domestic manufacture. Existing enterprises, including the State Forest Industry A–B, expanded their manufacturing facilities. Tar production now amounts to 50,000–60,000 metric tons per annum. Approximately 60 producers, representing between them one-third of the total Swedish output, have joined the Association (2; 8.1.44).

The wood-carbonization plant that is now being erected at Hogforsbruk by Hogfors A–B is expected to be the largest plant of this kind in Sweden. It will manufacture chiefly charcoal for use in gas producers, but equipment is also being installed for the recovery of wood tar, pyroligneous acid, and other by-products. The plant will be able to produce 300,000 hectolitres of charcoal per annum (2; 15.4.44).

In order to overcome shortages of imported liquid fuels, Sweden is using waste wood for the extraction of industrial and motor oil. Many forests have large numbers of dead trees and other trees that are unsuitable for saw timber or pulpwood, and recently a large distillation plant has been established in northern Sweden to utilize this type of material. The timber is floated to the plant where it is dried, split, and fed into retorts. There are 12 retorts with a total capacity of approximately 1,000 cubic yards of wood per 24 hours. The gases obtained are conducted to a large condensing plant. 'Motor tar', which is used by a large part of the Swedish fishing fleet as a substitute fuel, is the most important product of the plant at present. Methanol is also manufactured in considerable quantities. It is expected that the recovery of acetic products and phenols from the waste liquor will begin soon. The residual charcoal is sent to the iron works. This enterprise, which is owned by the Swedish State Board of Forests and Crownlands, is not considered merely an emergency project; it is expected that many Swedish industries will make much greater use of wood derivatives in the future than they have done in the past (2; 18.12.43).

United States. From an article by J. L. Muller (1; February 1944):—In the past two decades the development of softwood-plywood production has been spectacular, as shown in the table below. The bulk of the plywood is of Douglas Fir timber, and the remainder mainly of Ponderosa Pine and Southern Yellow Pine timber. Labour shortage in the woods has constantly handicapped the industry since the beginning of the war. No easing of war demands is expected, and it is thought that with the termination of the war the market will be maintained by civilian requirements.

SOFTWOOD-PLYWOOD PRODUCTION, 1925-43
(⅜-*in. basis*)

Year	*Million sq. ft.*	*Year*	*Million sq. ft.*
1925	153	1935	480
1926	173	1936	700
1927	206	1937	725
1928	276	1938	650
1929	358	1939	1,000
1930	305	1940	1,200
1931	235	1941	1,600
1932	200	1942	1,800
1933	390	1943 (estimated)	1,506
1934	384		

Note.—Data through 1941 supplied by Douglas Fir Plywood Association. Data for 1942 and 1943 compiled by the Bureau of the Census, U.S. Department of Commerce, except that the figure for 1943 includes 130 million sq. ft. estimated by the Lumber Unit, Bureau of Foreign and Domestic Commerce, as having been produced in December.